MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

IN RELATION TO

THE SURVEY OF A ROUTE FOR A CANAL

BETWEEN THE

GULF OF MEXICO AND THE ATLANTIC OCEAN.

FEBRUARY 28, 1829.
Read, and ordered that 6000 copies be printed.

To the Senate and House of Representatives of the United States:

WASHINGTON, *February 25th*, 1829.

By the act of Congress of the 3d of March, 1826, for the survey of a route for a canal between the Atlantic and the Gulf of Mexico, the President of the United States was authorized to cause to be made, an accurate and minute examination of the country south of the St. Mary's river, and including the same, with a view to ascertain the most eligible route for a canal, admitting the transit of boats, to connect the Atlantic with the Gulf of Mexico, and also with a view to ascertain the practicability of a ship channel; that he cause particularly to be examined the route to the Appalachicola river or bay, with a view to both the above objects; that he cause the necessary surveys, both by land and along the coast, with estimates of the expense of each, accompanied with proper plans, notes, observations, explanations, and opinions of the Board of Engineers; and that he cause a full report of these proceedings to be made to Congress.

In execution of this law, I transmit herewith a report from the Secretary of War, with a copy of that of the Board of Engineers, upon this great and most desirable national work. The time not having allowed a copy to be taken of the map, one copy only of the whole report is now transmitted to the Senate, with a request that it may be communicated to the House of Representatives, and that the map may be ultimately returned to the Department of War.

JOHN QUINCY ADAMS.

DEPARTMENT OF WAR,
February 23d, 1829.

SIR: I have the honor to transmit, herewith, a copy of a report of the Board of Engineers for Internal Improvement, on the surveys which have been made with a view to ascertain the practicability of connecting the Atlantic Ocean with the Gulf of Mexico, by a canal across the peninsula of Florida, and which report is, by the act of the 3d of March, 1826, to be communicated by the President of the United States to Congress.

As time has not been allowed for taking a copy of the valuable map which accompanies the report, it is desirable that the original should be returned to the archives of the Department.

I have the honor to be,
Very respectfully,
Your obedient servant,
P. B. PORTER.

To the PRESIDENT of the United States.

WASHINGTON CITY, *February* 19, 1829.

To Colonel CHARLES GRATIOT, *Chief Engineer.*

SIR: I transmit to you the report of the Board of Internal Improvement, on the contemplated canal between the Atlantic and the Gulf of Mexico.

Herewith are annexed to this report, seven individual reports made by the officers engaged in the surveys;

A general map of the country under consideration; and, on the same sheet, the entrances, drawn on a large scale, of all the harbors and sounds from Vassasousa bay to Mobile bay, and from St. Augustine to St. Mary's.

Thirty sheets of surveys, numbered from I. to XXX.

I am Sir, very respectfully,
Your obedient servant,
(Signed) BERNARD, *Brigadier General,*
Member of the Board of Internal Improvement.

REPORT

Of the Board of Internal Improvement, on the contemplated Canal between the Atlantic and the Gulf of Mexico.

The act of Congress, in consequence of which the present report is respectfully submitted, is entitled and worded as follows:

"An act for the survey of a route for a Canal between the Atlantic and the Gulf of Mexico.

"*Be it enacted, by the Senate and House of Representatives of the United States of America, in Congress assembled,* That the President of the United States be, and he is hereby authorized to cause to be made, an accurate and minute examination of the country south of St. Mary's river, and including the same, with a view to ascertain the most eligible route for a canal, admitting the transit of boats, to connect the Atlantic with the Gulf of Mexico, and also with a view to ascertain the practicability of a ship channel; that he cause particularly to be examined, the route from St. Mary's river to the Appalachicola river or bay, and from St. John's river to the Vassasousa bay, with a view to both the above objects; that he cause the necessary surveys, both by land and along the coast, with estimates of the expense of each, accompanied with proper plans, notes, observations, explanations, and opinions of the Board of Engineers; and that he cause a full report of the proceeding to be made to Congress: and, to carry the same into effect, the sum of twenty thousand dollars be, and the same is hereby appropriated, out of any money in the Treasury not otherwise appropriated.

"*Approved, March 3d,* 1826."

Agreeably to directions from the Engineer Department, dated March 15th, 1826, the Board of Internal Improvement drew up, and forwarded on the 18th March, 1826, the necessary instructions for the surveys which, in conformity with the aforementioned act, were to be performed between the Atlantic and the Gulf of Mexico, as also along the coast. The execution of these surveys was intrusted to Major P. H. Perrault, of the Topographical Engineers. He was enjoined to divide his brigade into two parties, to be employed: one on the eastern side, the other on the western side of the Florida ridge. The eastern party was composed of Lieutenant Frederick Searle, of the artillery, assisted by Lieutentants Benjamin Huger and A. H. Brisbane, of the artillery; the western party was under the direction of Lieut. W. H. Swift, of the artillery, assisted by Lieutenants Walter Gwynn, A. Canfield, of the artillery, and Lieutenant J. R. Smith, of the infantry. The memoirs, maps, and charts, relating to the surveys executed by this brigade, were forwarded to the Board of Internal Improvement, on the 8th of February, 1828; they accompany the present report.

Previously to the completion ofthe surveys, the Board had made, during the spring and part of the summer of 1827, a personal examination of the country between the Atlantic and the Gulf of Mexico, as also of the coast on both sides of the peninsula. During their examination by land, they were accompanied by the officers who had surveyed the several sections of canal routes. As to the reconnoissance and sounding of the coast on the Gulf of Mexico, from Tampa bay to the bay of Mobile, Captain Winslow Foster, commander of the United States' Revenue Cutter Alabama, had been directed by the honorable Secretary of the Treasury, to co-operate, in his vessel,

with the Board: his assistance has been of the greatest service, and the Board have derived from his thorough knowledge of the coast, the most valuable information.

To render the present report more intelligible, the Board have caused a general map to be annexed to it: this map, drawn up under their direction, by Lieutenant W. H. Swift, of the artillery, is much to the credit of this industrious and meritorious officer. It is made out of the best authenticated materials, and exhibits the connexion of the individual surveys performed by the officers of Major Perrault's brigade. With this general map are found, on a larger scale, the entrances of all the harbors and sounds, from Vassasousa bay to Mobile bay, and from St. Augustine to St. Mary's. The authorities used in the framing of the map and charts are designated on their respective draughts.

The delta of the Mississippi, being the termination of our inland navigation along the coast of the Gulf, has been connected, on the general map, with the coast of Alabama and Florida; its improvements bear a relation with those along the coast, and as such they have claims to a place in the present report. This report will be divided under the following heads:

Topographical and Hydrographical Description.

Surveys and Levellings executed by Major Perrault's Brigade.

Investigation of the several routes of a Canal across the Peninsula of Florida.

Inland Navigation along the Coast, from Tampa Bay to the head of the Delta of the Mississippi.

Improvements through the Delta of the Mississippi.

Summary.

Topographical and Hydrographical Description.

General Map I—The part of the peninsula of Florida, comprehended between the southern boundaries of Georgia, and a line drawn from Tampa bay to Cape Cañaveral, is an extensive pine forest, interspersed with numberless lakes, ponds, low savannas, and cypress swamps of various sizes. The country, though generally flat, is, however, much undulated in some districts, and even hilly in many places. The ridge, which divides the waters emptying into the Atlantic from those running into the Gulf, is sloping gradually from north to south, and seems to become totally depressed south of a line drawn from the bay of Tampa to Cape Cañaveral. Indeed, all that great tract of country south of this line, is represented, by those best informed, as an extensive marsh forbidding, during the rainy season, (between June and October,) any land passage from the Gulf to the Atlantic. The elevation of the ridge above the level of the sea, has been found to be 152 feet at the head of St. Mary's river, near the Georgia line; 158 feet between Kinsley pond and little Santa Fé pond, head of Santa Fé river; and 87 feet between the head branches of the Amaxura and Ocklawaha.

The soil is generally sand, except at places called hammocks, the soil of which is either a red, yellow, or black clay mixed with sand. These hammocks are numerous, and much scattered throughout the country; they vary in extent from a few acres to thousands of acres, and form together but an inconsiderable portion of the peninsula. On them, the growth of tree is red oak, live oak, water oak, dogwood, magnolia, and pine—the red oak predominating. Whilst these hammocks, under the auspicious climate of

Florida, present a very productive arable land, the pine forests afford every facility to the raising of cattle; and under this point of view, this part of the peninsula may be considered as a much valuable grazing country.

It is to be observed that, in Florida, the fern grass is exclusively peculiar to low grounds and heads of water-courses.

If the upper stratum of the peninsula is generally sand on both sides of the ridge, and that to a depth of at least five or six feet, the sub-stratum is not the same on both sides: on the eastern, it is clay mixed with a great deal of sand; but on the western, it is, throughout, a kind of stratified rotten limestone, which frequently appears at the surface, and which, at many places, is undermined by streams sinking abruptly to take their passage through the cavernous parts of the mass, and to resume, at some distance down, their natural course. It is owing to the numerous cavities of this rotten sub-stratum, that the surface of the ground is seen interspersed with numberless inverted conic hollows, called *sinks*, the size of which varies from a few square yards, to many acres.

The streams which run through the peninsula, present generally no *flat bottom*, or arable fluviatic deposite along their banks; they force their course through the sandy upper stratum, and are fed more by lateral filtration than by tributaries. However, their margins are often trimmed with trees, such as live oak, water oak, magnolia and laurel thicket, which receive chiefly their nourishment from moisture.

The sea along the western coast of the peninsula, is shallow, from Tampa bay to Appalachie bay, and on a width varying from 5 to 15 miles. From the latter to Cape San Blas, this width diminishes, except at the intervening Capes, where extensive shoals project out; but, from Cape San Blas to Lake Ponchartrain, the shore is generally bold, and the coast affords several good harbors. As to the coast on the Atlantic, the sea is all along shallow, and offers no harbors except at the mouth of St. John river and St. Augustine.

The shortest distance across the peninsula, is about from St. Augustine to a point on the Gulf between the mouths of the Suwannee and Amaxura rivers: this distance is 105 miles. The distance, in a straight line, from the mouth of the St. John to that of the Suwannee is 130 miles, and from the mouth of the St. John to St. Mark, 170 miles.

The streams which run through Florida, and have an immediate connexion with the object under contemplation, are, on the Atlantic, St. John, Nassau, and St. Mary's river; on the Gulf, Suwannee, St. Mark, Ochlockony, and Appalachicola rivers. With regard to Hillsborough river, emptying into the bay of Espiritu Santo, and to the Amaxura, they are too far south to afford a convenient termination to the contemplated communication; besides, the country in their direction presenting no supply of water to pass over the ridge, these streams will remain unnoticed in the present report.

MAP I. II. *St. John river.*—The river St. John may be considered as an arm of the sea; it runs from south to north, which is contrary to the generality of the streams of the United States: perhaps it has been formerly a sound, which the washing of the Gulf Stream has closed up at the southern end. For twenty miles above its mouth, it keeps an easterly direction, and is, on this distance, narrower than farther up: this circumstance causes a very strong current down the river—a current which continues for nearly three hours after the tide has commenced to rise: and the contrary effect takes place, for about two hours after the tide has commenced to fall. The former is a considerable obstacle to vessels passing the bar to come in, and

the latter to vessels sailing out: in either case they require a strong and fair wind to stem the current.

The bar, at the mouth of the river, is shifting; the greatest depth on it is 15 feet at high tide; but, on account of winds, it varies from 12 to 15 feet. At low tide, the least depth on the bar is 6 feet, the greatest 7½ feet. As there is constantly more or less swell, a vessel drawing more than 11 feet could not cross the bar with safety, but might ascend easily the river as far up as the mouth of Black creek: on this distance, of forty-seven miles, the channel is wide, and affords a depth never less than 15 feet; a vessel can beat through it, except at Dame's Point and opposite the mouth of Cedar creek, 2½ miles above Dame's Point.

From Black creek to Lake St. George, vessels drawing 9 feet can beat across the channel of the river; but when opposite the mouth of the Ocklawaha, they must be forced through a bed of mud. At the entrance of Lake St. George, the depth on the bar is 9½ feet. The distance from Black creek to this Lake is about 60 miles, and from the latter to the mouth of the river about 107 miles.

The river St. John, above Black creek, is slightly influenced by the northerly winds; but, below, the winds contribute much to the rise and fall of the stream. As to freshets, they do not rise more than 2 feet: this may be attributed to the great width of the river, which is, at many places, more than three miles across. At Picolata's Ferry, the tide rises about 4 feet.

The banks of the St. John are principally marsh, hammock land, pine barren, and cypress swamp. The depth of the soil of the latter is hardly one foot above the sandy under stratum. Respecting the hammocks, they are much limited in number and extent; and, where found, they do not average more than 150 yards in breadth from the margin of the river. The live oak is becoming more and more scarce. Volusia, on the St. John, above Lake St. George, is a bluff, contiguous to some wet hammocks; this place and Spring Garden, 25 miles above, are old English settlements; the latter, more especially at Major Woodruff's plantation, is represented as very productive, and not liable to be exhausted. The country, east and west of St. John, is sandy, and thinly timbered along the sea coast: the growth of trees is throughout pine, and cypress in the swamp. The land, immediately along the St. John, is generally a light sandy soil, well adapted to the cultivation of cotton, but liable to become soon exhausted.

The St. John has but two tributaries of consequence, the Ocklawaha and Black creek.

The Ocklawaha takes its rise out of the lake Apopka, about 73 miles above its mouth: at the outlet of this lake, the stream is fifteen feet wide and and 7 feet deep; but the width and depth of the river are increasing gradually down to St. Johns. The lake Apopka being but 80 miles from the bay of Espiritu Santo, the Ocklawaha, if improved, might greatly facilitate the inland communication between this bay and the Atlantic: in this direction, the distance from the mouth of the St. John to the bay, is about 260 miles, out of which 180 would be by water, and 80 by land. Sixteen miles above its mouth, the Ocklawaha receives the outlet of Orange lake. The banks of this river are represented as lined at many places with well timbered hammocks. The country, through which run the head branches, is generally sandy, with a pine growth; it presents, however, some fine hammocks, and also extensive prairies subject to be overflown in rainy weather: numerous ponds and lakes are met with in every direction.

MAPS I. III.—Black creek, at its entrance into the St. John, presents a wide cove, across which stretches a bar, having a depth of 8 feet at high tide, and 6½ feet at low tide. After crossing this bar, the depth increases, and 12 feet may be carried as far up as the fork, 12⅝ miles from the St. John. At Branum's Ferry, 5 miles below the fork, the depth is 35 feet, and the width about 120 yards: the stream retains the same width down to its mouth. The tide is felt in Black creek, but is much influenced by the prevalence of winds: at Branum's Ferry, it generally varies from 18 to 24 inches—sometimes it is but a slight swell; at the fork the tide rises one foot.

The banks of Black creek, below its fork, are chiefly cypress swamps; there are six or seven bluffs which are cultivated, and present a strip of hammock land extending from 20 to 100 yards from the stream. The interior of the country is generally sandy and timbered with pine.

The head branches of Black creek are, the north prong, and the south prong, into which empties Bull creek. The north prong has a depth of 6 feet, and is navigable as far up as Fougere's mill, 5 miles above the fork. The south prong is navigable up to the mouth of Bull creek, where there is a depth of 6 feet, and a rise of tide of a few inches: this prong, or fork, receiving but one tributary, the valley of which is deep and rapid, is not subject to high freshets; but the north prong has been known to have risen to the height of 22 feet near the fork.

The north prong takes its rise out of Kinsley's pond, which can be considered as the head of Black creek, and is 171 feet above low tide at the mouth of the St. John.

MAP I. *Nassau River.*—Nassau river is the drain of the low grounds extending between St. Mary's river and the St. John; it empties into Nassau Sound, and is therefore subject to the rise and fall of tide. It is connected with St. Mary's river and the St. John, by an inland water communication, called Inland Passage, which runs parallel to the coast between the main and the Islands of Amelia, Talbot, and Fort George. This passage is very crooked, and at some places very narrow; row-boats only can pass through it at high tide. At low tide, the channel is obstructed, at four places, by shallows formed at the meeting points of tides. The first obstruction is found between St. Mary's and Nassau rivers: for two miles the channel is left dry at low tide, and affords but 3 feet at high tide. The second is between Nassau river and Talbot inlet; the extent left dry, at low tide, is 700 yards: four feet are found at high tide. The third obstruction, between Talbot inlet and the St. John, has but one foot of water at low tide, on a length of 400 yards. The fourth obstruction is of less importance; it consists of a narrow bar at the Sisters' Bluffs, which might easily be improved. The distance through this inland passage, is 34 miles from St. Mary's to St. John rivers.

St. Mary's river.—St. Mary's river flows generally through narrow strips of wet hammocks; the banks immediately adjoining are high, their soil sandy, their growth pine.

The greatest depth of water on the bar, at the entrance of St. Mary's harbor, is as much as 22 feet during spring tides, when easterly winds have blown for a considerable time, and 13½ feet only at low tide. The tide is felt as far up as Barbour's plantations, 50 miles from the mouth of the river; the river is considered navigable on this extent. As far as its junction with Bell river, it is navigable for any vessel which could cross the bar of St. Mary's harbor; the same remark is applicable to Bell and Jolly rivers.

St. Mary's river takes its rise out of the extensive swamps which are on the Georgia line, and stretch between the head branches of St. Mary's and Suwannee rivers. These swamps, called emphatically dismal swamps, are generally covered with a thick growth of bay trees, vines, and undergrowth; at some places short bay bushes, at others sedge grass, are the only growth. No lake or natural reservoir of importance is to be found; but, on account of the great extent of the swamps draining both ways into the Suwannee and St. Mary's river, these streams are subject to high freshets during the rainy season, and after a sudden heavy rain. At the upper fork of St. Mary's river, the rise of the freshets is about 6 feet.

In following the windings of the river, the distance from the Atlantic to the very head of the stream, 13 miles above the upper fork, is about 105 miles. This head, which is on Ten Mile branch, a tributary of Alligator creek, is the dividing point between the Suwannee and St. Mary's river, and the summit point of the ridge between the Atlantic and the Gulf; its elevation, above low tide in the ocean, has been found to be 152 feet. At Trader's Hill, 40 miles from the entrance of St. Mary's harbor, the elevation above low tide in the harbor is 15 feet; it is 118 feet at the upper fork.

From Trader's Hill to the Atlantic, the river keeps an easterly direction; but from the mouth of South Branch to Trader's Hill, it descends to the north, whilst, from the upper fork to the mouth of South Branch, its course has been to the south. This winding makes the distance from Trader's Hill to the upper fork, 50 miles: it would be but 25 in a straight line. The summit ground, between Barbour's plantation and the upper fork, has been found to be 100 feet above low tide in St. Mary's harbor.

Maps iv. v. vi. vii.—*Suwannee river.* The Suwannee river takes its rise out of the extensive swamps stretching on the borders of Georgia, across the summit of the ridge which divides the waters emptying into the Atlantic from those running into the Gulf of Mexico; it empties into the bay of Vassasousa or Vacassar. The distance from the Georgia line to the mouth of the river, is about 155 miles, in following the stream; from the fork, at the confluence of the Withlocoochy, the distance to Vassasousa bay, is about 100 miles. At about 55 miles above its mouth, it receives the Santa Fé river, which is its only tributary of any importance from the fork to the sea.

One mile below Wheaton's plantation (in Georgia,) the Suwannee has been seen entirely dry; however, in June and July, 3 feet are often found on the shallowest places below. The bottom of the river is rocky in many places, and, about 20 miles below Wheaton's plantation, there is a fall of 3 feet.

From the upper fork to the mouth of the Santa Fé river, the Suwannee continues to flow through a stratum of rotten limestone, lying generally 5 or 6 feet below the surface of the ground. This limestone is of a porous nature; and, by letting water pass freely through it, causes the stream to be supplied chiefly by filtration. On the margins of the stream, are occasionally narrow strips of swamps, affording a growth of live oak, water oak, cypress, magnolia, and laurel bushes; the adjacent country is a sandy pine forest. The width of the river averages about 110 yards, and the depth, at the lowest stage of water, would become at least 3 feet through, by removing some ledges of rock which obstruct the navigation; at the mouth of the Santa Fé, the depth is 12 feet. It must be remarked that the Suwannee, having, from its upper fork to the sea but one tributary, and its banks being thinly timbered, rather low and not much liable to be undermined, is generally free from drift wood; circumstances which, added to a good depth of water, render the river well adapted to steam-boat navigation.

From the mouth of the Santa Fé to the sea, the Suwannee presents an uninterrupted navigation, except at its entrance into Vassasousa bay, where it is closed up by shifting sand bars, on which, at low tide, there is but a depth of four feet. The river, from the mouth of Santa Fé to the Indian Cow-Pen, 35 miles below, affords a depth never less than 12 feet. The banks average 5 feet in height, and often exhibit layers of rotten limestone. The pine forest extends frequently to the very margins of the stream; but, at intervals, low and narrow hammocks, with a thick growth of live-oak, water-oak, and maple, are met along the river.

From the Indian Cow-Pen to the sea, the Suwannee flows through an extensive cypress swamp, inundated at all seasons: the distance is about 20 miles. At the approach of the Gulf, the river exhibits the appearances of a marshy delta, through which run to the sea numerous outlets. The depth, and even the course of the latter, experience frequent and sudden changes, caused by the storms from the sea, and the flood from the stream. The entrance of these outlets is, moreover, obstructed by an extensive oyster bank, projecting, at the least, one mile out of the shore, and furrowed by many narrow channels, of various depths. The main one runs near to the western extremity of the oyster bank, and opposite the western and principal outlet of the river: it affords, at high tide, 5½ feet of water. This rise of tide varies from 18 to 36 inches, and is chiefly governed by winds. From Bradford's Island, at the mouth of the river, to Arbuthnot's old store, the distance is 2 miles; 8 feet can be carried through this channel; but, higher up, the least depth found in the stream, as far up as the mouth of the Santa Fé, is, as it has been stated before, 12 feet. However, at many places, the depth is as much as 35 and even 40 feet.

The Suwannee is subject to freshets, which are represented to take place during the winter season: In June and July, the river is at its lowest stage. The rise caused by freshets is 4 feet at Bradford's Island, 8 feet at the Indian Cow-Pen, 15 feet at the mouth of the Santa Fé, and 6 feet at the upper fork.

Maps VIII. IX. The Suwannee has but one tributary of importance, which, as stated before, is the Santa Fé river. Its main head branch takes its rise out of the little Santa Fé pond, and receives Sampson's river, which is the outlet of Sampson's pond; its south head branch rises not far from Pithlochucco Lake, the north head branch descends from the ridge which separates it from the south branch tributary of St. Mary's river.

Following the streams, the distance from Sampson's pond to the entrance of Sampson's river into the Santa Fé is 4¾ miles; from this point down to the mouth of north branch (or north fork,) the distance is 12¾ miles; hence it is 11 miles to the point where the river sinks to re-appear 3 miles lower down, and 28 miles from the place where the river comes out of its subterranean passage to its mouth in the Suwannee; this mouth is at about equal distance from the upper fork of the latter, and from the bay of Vassasousa. Thus, the whole distance from Sampson's pond to the Suwannee, in following the windings of Sampson's river and Santa Fé, is about 60 miles. The distance would be nearly the same, if taken either from little Santa Fé pond, or from Pithlochucco.

The place under which the Santa Fé river runs, through a substratum of stratified limestone, is called Natural Bridge; it is subject to inundation from freshets, the waters not finding there a sufficient opening to their discharge; the valley of the stream is about one mile wide at this place.

The Santa Fé is represented as being, at many places, obstructed by drift wood, which, being removed, would open a navigation for boats drawing 3 feet.

Rock creek, on the south side, and Itchatuckny creek, on the north side, are the tributaries of Santa Fé river: the latter empties at about 9 miles above the entrance of the Santa Fé river into the Suwannee.

The declivity of the Santa Fé river is about 64 feet, from Sampson's pond to the Natural Bridge, and hence 50 feet to the Suwannee: at the confluence of these two streams, the elevation above the sea is but 10 feet.

The banks of the Santa Fé are generally flat, the hills slope gradually towards the stream, and do not make close to it. The margins are frequently lined with thick hammocks, averaging as much as 300 and even 500 yards, and subject to be overflown during the freshets. The country through which flows the river, is undulating, sandy, and covered with pine; it is interspersed with *sinks* and swamps; and more especially in the upper parts of Santa Fé, numerous bay-golls, ponds, and extensive palmetto flats are met with in every direction.

The Santa Fé river derives much importance from the large lakes and ponds which are found in the vicinity of its heads, and near the summit of the dividing ridge of the peninsula; we shall, therefore, enter into the description of these natural reservoirs.

They are, in succession, from south to north, Orange lake, Alachua savanna, Pithlochucco lake, Aquila pond, little Santa Fé pond, Sampson's pond, and Kinsley's pond, at the head of Black creek: the three first are on the eastern side of the ridge, the three next on the western side.

Map x.—*Orange Lake* has a superficies of 84,662,666 square yards, and an average depth of 10 feet during the rainy season; but, during the dry season, the lake becomes fordable at many places. This great reservoir discharges itself into Ocklawaha river (a tributary of the St. John,) through the outlet of Orange creek, and is in communication with Alachua savanna, through Chechale run. Half of the surface of the lake presents to the eye a fine sheet of water, but the remainder exhibits a luxuriant growth of aquatic grass. The northern shores are very low swamps, and difficult of approach; the opposite banks are rather high, with a thick growth of timber on some intervening hammocks: wild orange trees are often met with on these banks.

Map xi.—*Alachua Savanna* lies about 4 miles above Orange lake; its length is 7 miles, and its breadth 3 miles. The great body of water in this savanna is represented as losing itself in a large *sink*, supposed to be at the northern side, and to discharge itself through a subterranean passage into Orange lake. Whatever may be the case, this savanna exhibits but the appearance of a level watery meadow, covered with a thick growth of aquatic grass, a circumstance which makes it to be called, in the idiom of the country, a *grassy lake*. Its outlet, the Chechale, which flows into Orange lake, is rather of small size. The Alachua savanna is lined with hammocks, in which the live-oak and water-oak are predominating.

Map xi.—*Pithlochucco Lake* empties into the Alachua savannna; the distance between them is hardly one mile; they are connected by an outlet at the southern end of the lake, and Hatchet creek, at the northern end, forms the head of the basin. The extent of this natural reservoir is about 37 millions of square yards, its average depth 7 feet. The southern branch of the Santa Fé heads north-west of Pithlochucco lake.

Aquila, or Big Santa Fé Pond, lies at one of the sources of the main branch of the Santa Fé river; its extent is about ——— in superficies, its depth on an average ———.

Map xi.—*Little Santa Fé Pond*, is rather a cypress swamp, and cannot be deemed of great importance as a reservoir, when the sluggishness of its outlet is taken into view.

Maps iii. ix. xi.—*Sampson Pond*, or rather lake, is formed of two sheets of water, one of which is one foot higher than the other; they are separated by a narrow cypress swamp: at high water, the latter is overflown, and the whole lake is on a same level. The two sheets present together a superficies of 16,362,777 square yards; the depth has not been ascertained: it is supposed to be 8 feet. The rise, during the rainy season, is 3 feet. Alligator creek empties into the pond; it has its sources about 7 miles east of the latter, and but one mile from Kinsley's pond, head of the north prong of Black creek.

Map iii.—*Kinsley's Pond* has a superficies of 7,714,000 square yards; its depth has not been ascertained, and, from appearances, may average 6 feet. In dry seasons, the outlet yields no water, and the extent of country drained by the pond is inconsiderable.

The relative elevations of these lakes and ponds are as follow:

Eastern side of the ridge.

Orange lake,	above the ocean,	- 41	feet.
Alachua savanna,	do	- 48	do
Pithlochucco lake,	do	- 50	do
Kinsley's pond,	do	- 171	do

Western side of the ridge.

Big Santa Fé pond,	above the ocean,	- 121	feet.
Little Santa Fé pond,	do	- 126	do
Sampson's pond,	do	- 126	feet 4.

St. Mark's River.—This river seems to be the channel receiving the subterranean streams, through which is drained the mass of rotten limestone, forming the rich and extensive spur on which lies Tallahassee. Indeed frequent *sinks* are seen in the direction of its course; and, about 12 miles above Fort St. Mark, is seen one of those interruptions called Natural Bridge, where the stream re-appears after having sunk at some distance above.

Though St. Mark's river presents an inconsiderable extent of navigation, yet it has the advantages of affording, at high tide, 8 feet of water at its mouth, and of possessing, 8 miles lower down, a good anchorage for vessels drawing 10 feet. There are two bars: one, 3 miles below Fort St. Mark, called the Devil's Elbow, with a depth over it of 8 feet at high water; the other, called Outer-bar, 8 miles from Fort St. Mark, with a depth of 12 feet. From this bar to the Devil's Elbow the channel is 5 miles in length, 350 yards in width, on an average, and affords a depth of 10 feet. The foregoing channel takes a sudden turn to the west through the Devil's Elbow; at this place the width is reduced to about 40 feet, on a length of nearly 440 yards, the bottom is limestone rock covered with shells and mud. From the Devil's Elbow to Fort St. Mark, 8 feet can be carried through at high water.

The Outer-bar lies at the entrance of Appalachie bay, and connects, in some sort, the extensive shallow banks which, to the east and to the west,

obstruct this section of the coast of Florida. These banks protect the anchorage within the Outer-bar, and thus present the only shelter to be found from the bay of Espiritu Santo for vessels drawing 10 feet. The place called the Spanish Hole, 3 miles within the Outer-bar, is the best to lie at anchor; the depth is 12 feet at high water.

Fort St. Mark is situated at the embranchment of the Vakulla with St. Mark's river; the low grounds around it are subject to be overflown by either rain, or the sea raised by southerly winds. The fort is in a state of dilapidation; but when the settlements in the vicinity of Tallahassee will have acquired the importance to which the richness of the soil and the mildness of the climate entitle them, it will become necessary to have the work in good order. There is a good road from Fort St. Mark to Tallahassee; the distance is 23 miles.

MAPS XII. XIII. XIV.—*Ocklockony River.* The Ocklockony takes its rise in Georgia, passes west of Tallahassee, within a distance of about 12 or 15 miles, and empties into the bay of Ocklockony. The entrance of the river into the sea is obstructed by oyster banks; however, 7 feet, at low tide, can be carried through the bay, and also in the river, as far up as the mouth of Crooked creek, 10 miles above the bay. The mean rise of tide is 2 feet 8 inches.

From the bay to the mouth of Crooked creek, the margins of Ocklockony river are low and swampy, the pine forest approaches but occasionally the shores of the stream.

The upper parts of the Ocklockony having not an essential bearing to the object under consideration, the river has not been examined higher up than the mouth of Crooked creek; but taking into notice that it approaches Tallahassee within a few miles, it would be of some interest to ascertain the present state of its navigation, and to point out the improvements which might be necessary.

MAP XIV.—*Crooked Creek* connects the Ocklockony with New river; it runs parallel to the coast through cypress swamps and pine barren; its length is $20\frac{2}{3}$ miles, and its least depth 5 feet at low water. It debouches into New river, $3\frac{4}{5}$ miles above the entrance of the latter into St. George's sound.

The mouth of New river is closed up by an extensive bank, having no more than 1 or 2 feet water. From this bank $4\frac{1}{2}$ feet can be carried, in the river, to Crooked creek.

MAP XV.—*Appalachicola River.* This river, having Flint river and the Chatahootche for head branches, both of which are navigable for steam-boats, it is much to be regretted that its entrance into the Gulf should be so much obstructed by the extensive shallow banks which form the bottom of Appalachicola bay.

The Appalachicola has three outlets into the latter bay: 1st, a straight channel close to the right shore, and through which 5 feet only can be carried at low tide; 2d, the main channel, which is very crooked, bends in a semi-circle towards the east, and affords, up to the river, a depth of $7\frac{1}{2}$ feet: 3dly, the swash, or north east channel, which comes into the main channel 3 miles from the bar, and presents a depth of five feet through. It must be remarked that the tide makes earlier in the first channel than in the others. The mean rise of tide has been $1\frac{3}{4}$ feet for ten days observation.

Lake Wimico is represented as being in communication with the river; it has been neither sounded nor examined.

The bay of Appalachicola, as it will be stated hereafter, cannot admit, at low tide, vessels drawing more than ten feet. But the shallowness of this bay cannot lessen its importance, when taken into consideration that one-third of the territory of Georgia is put in communication with the Gulf through Appalachicola river and its upper branches.

Such are, in relation to the streams, lakes and ponds of Florida, the main facts which are immediately connected with the object under consideration. We shall now pass to those which have reference to the coast, both on the Atlantic and on the Gulf.

Coast on the Atlantic.

Owing, very likely, to the current of the Gulf Stream, which causes an accumulation of sand and deposite all along the eastern coast of Florida, this coast is shallow, and presents no harbor of consequence: St. Mary's (Georgia) is, on that account, of great importance, both in relation to defence and to commerce. South of St. Mary's the two only shelters for vessels are the mouth of St. John river and the harbor of St. Augustine.

Map 1.—*St. Mary's Harbor* affords, on its bar, 13½ feet at the lowest water, and as much as 22 feet during spring tides, when easterly winds have been blowing for a considerable time: the mean rise of tide is about 6 feet. The channel over the bar leads into the harbor from the south-east, and enters between Cumberland and Amelia Islands: the entrance is less than a mile wide, and can be defended by fortifications. St. Mary's river, as far up as its junction with Bell river, Jolly river, and Bell river, can admit any vessel which can cross over the bar.

Map 1.—*St. John River*, as it has been stated before, has a shifting bar, which obstructs its entrance into the sea; the least depth on the bar is 6 feet at low tide, and 12 feet at high tide; however, these depths are much influenced by winds, and the greatest is, at low tide, 7½ feet, and at high tide, 15 feet. The channel comes in from the east, and passes between the main and Fort George Island: it is susceptible of being defended by permanent works. There is a constant swell on the bar, which, added to the shifting of the bar and to the strong current from the river, (which continues nearly three hours after the tide has commenced to rise,) renders difficult and sometimes dangerous, the entrance into St. John river.

Map xvi.—*St. Augustine Harbor* offers to merchant vessels a safe shelter between the main and Anastasia island; but the entrance is rendered difficult, and even dangerous, on account of breakers which constantly make upon the bar, and more especially when the wind blows from the eastward. The depth on the bar is 7 feet at low water, and 12 feet at high tide. The channel comes in from the south-east. The entrance between Anastasia Island and the main, is a little more than a half a mile wide; it is not fortified. The existing fort, erected by the Spanish government, protects the anchorage into the harbor, but it does not defend immediately the entrance: by being located at the northern end of Anastasia island, it would have fulfilled both objects. This work is regular, and formed of four bastioned fronts, each of them having a length of about 100 yards. In time of war, it might be used to receive supplies and ammunitions in safe custody. This fort is built of a kind of limestone, formed of the aggregation of small shells, and quarried in Anastasia Island. This stone, if exposed to the washing of the

sea, cannot be deemed a good building material; however, it hardens by exposure to the air, and is used at St. Augustine to great advantage for private and public buildings.

Coast on the Gulf of Mexico.

This coast has been examined and sounded at the interesting points and passes from the bay of Espiritu Santo to Mobile bay; in 1817, the section from Mobile bay to the bay of Barataria (Louisiana,) was examined and sounded at the important points, by Commodore D. T. Patterson, General S. Bernard, and Lieutenant James Gadsden, of the Engineers, with a view to the defence of Louisiana: this Board was assisted by Captain Wm. Tell Poussin, of the Topographical Engineers. The facts obtained by both examinations will, by being connected in the present report, afford a full view of the coast from the bay of Espiritu Santo to that of Barataria.

Bay of Espiritu Santo.—This extensive bay comprehends at its head Hillsborough bay, on which is erected the healthy and well located cantonment of Lieut. Colonel Brooke, and Tampa bay, which extends west of Hillsborough bay. The bay of Espiritu Santo has three main channels, which, however, are subdivided into several passes: the northern pass is the ship channel; four fathoms can be carried through at low water, and 28 feet at high tide. The number of those channels, and the too great width between the islands and shoals through which they take their course, would render difficult and very expensive, the defence by permanent fortifications, of the bay of Espiritu Santo.

Four and a half fathoms may be carried within the bay as far up as the opening of Hillsborough bay; but, in the latter, the depth is gradually decreasing, and at the wharf of Col. Brooke's cantonment, it is but 3 feet at low tide, and 7 feet at high water. Within the bar of Hillsborough river, 12 feet can be carried up to a fall which is at 12 miles from the cantonment.

As to Tampa bay, it is represented as being very shallow and its banks very swampy.

The banks of the bay of Espiritu Santo are generally low, and shoals project out of the shore all round the bay: the distance, at the entrance between these shoals, may be estimated to be about 5 miles.

The coast from the bay of Espiritu Santo to the mouth of the Suwannee, in Vassasousa bay, has a length of about 135 miles; on this distance, the approach of the sea shore is forbidden for vessels drawing more than 4 or 5 feet: it is but 10 or 12 miles from the land that 12 feet are to be found. Oyster banks obstruct the bay of Vassasousa; and, as it has been said before, the Suwannee cannot be entered, at high tide, by crafts drawing more than 5½ feet, or rather 5 feet. The rise of tide varies, owing to the influence of winds, from 18 to 36 inches. Generally, all along the coast of West Florida, strong and constant southerly winds, increase by 18 inches, and even sometimes 2 feet, the rise of tide, whilst the opposite winds cause a contrary effect.

Bay of Appalachie.—The wide and shoaly bank, which obstructs the coast from Espiritu Santo to Vassasousa, continues uninterrupted to the bay of Appalachie, where its breadth is reduced to about three miles, and a channel found to enter the river St. Mark. This channel is accessible to vessels drawing ten feet, and affords to them a good anchorage, eight miles from

Fort St. Mark. Vessels drawing eight feet can, at high tide, reach St. Mark, as it has been stated, (page 11,) in describing the entrance of St. Mark river into the sea.

The distance along the coast from Vassasousa bay, mouth of the Sawannee, to Appalachie bay, mouth of St. Mark river, is about 95 miles; and the latter bay offers the only anchorage to be found from the bay of Espiritu Santo, it is to say, on an extent of coast of about 230 miles.

MAP XIII.—*Bay of Ocklockony.* This bay lies 18 miles south-west of St. Mark; its entrance is much obstructed by oyster banks; and its bottom may be considered as a part of the shoal which, from the Appalachie to Cape St. Blas, impedes the approach of the coast. The general width of Ocklockony bay is $1\frac{3}{5}$ miles, the length $6\frac{1}{3}$ miles; the depth which can be carried through the bay to Ocklockony river, is seven feet at low tide. The mean rise of tide is $2\frac{2}{3}$ feet, when southerly winds are blowing moderately.

The entrance into the bay is through oyster banks: there are two passes; one comes in from the south-east, and affords but six feet at low tide; the other, which is from the east, has a depth of seven feet, and is the main pass.

Ocklockony river empties into the bay of that name, and seven feet can be carried from the mouth of the river to that of Crooked river.

MAPS XVII. XVIII. XIX.—*St. George's Sound.* The shoal which extends all along and parallel with the coast, makes out abruptly, at Ocklockony bay, to the south, for a distance of about 12 miles, and projects from South Cape. West of this cape, it re-assumes its parallel course to the coast, and may be considered as terminating at Cape St. Blas: on this distance it forms the basis of the islands which cover St. George's sound.

These islands are three in number: Dog Island, 6 miles long; St. George's Island, 30 miles in length; St. Vincent's Island, 9 miles long. The distance from the eastern to the western end of the Sound, is about 50 miles; the width of the Sound, at its eastern extremity, is about 4 miles, and north to Cape St. George, about nine miles.

The Sound could be entered by these passes: one round the eastern point of Dog Island; the second between this Island and St. George's Island; the third between St. George's and St. Vincent's Islands. The first, called the Eastern Pass, offers a least depth of 14 feet at low tide: this depth is found on a width of 600 yards, on the bar, which lies at about $2\frac{1}{2}$ miles from the sound; the second, or Middle Pass, has a least depth, at low tide, of 15 feet on the bar; its channel is contracted between the shoals which make out of the two islands; the width, on the bar, for 15 feet water, is about 650 yards; the entrance is on Dog Island side. The distance from this Island to the eastern point of St. George's Island, is 3 miles. The third pass, called Main Pass, has a width, on the bar, of 300 yards, for a depth of 14 or 15 feet, at low tide. The bar lies south-eastward of Flag Island, and about 2 miles south-west of the entrance into the Sound. At this entrance, the distance between the two islands is but 1050 yards. With regard to the opening at the western end of St. Vincent's Island, as also to the Sound between this Island and the Main, the pass called Indian Pass, is represented as being very shallow, and practicable but for canoes.

From the Eastern to the Middle Pass, St. George's Sound affords from $2\frac{1}{2}$ to 3 fathoms of water; but hence, westward to the Main Pass, the Sound is much obstructed by oyster banks and sand banks, through which vessels drawing more than 6 feet cannot shape their course. The mean rise of tide

deduced from fifteen days, observation, has been found to be 2¼ feet.—The south-west wind was then prevailing.

Map xv.—*Appalachicola Bay*, makes within St. George's Sound. Its entrance into the Sound is upwards of 5 miles wide, measured from East Point to West Point, below the mouth of Appalachicola river. The distance from West Point to the entrance of the Sound between St. George's Island and St. Vincent's Island, is about 12 miles, in a straight course: but, on account of the obstructions in this part of the Sound, vessels bound up the bay are obliged to bend their route easterly, to reach the mouth of Appalachicola river, a circumstance which increases the distance by six miles. Vessels drawing ten feet can anchor in the bay, but only seven and a half feet can be carried up to and in the river.

Though the shoal along the coast does not discontinue from the bay at Ocklockony to that of Appalachicola, yet boats drawing five or five and a half feet, can, on this distance, navigate between the two bays, in keeping not far from the shore, and entering St. George's channel at its eastern end. Except at the Capes of St. George and St. Blas, where a shoal projects to the south, for four or five miles, the out shore of the islands covering St. George's Sound, as well as that of the peninsula forming the bay of St. Joseph, may be considered as bold within a short distance from the land.

Map. xx.—*St. Joseph's Bay.* The coast, after having made from Espiritu Santo to Cape St. Blas, a great bend towards the north, assumes gradually, west of the Cape, a western direction, which it preserves to the head of Lake Pontchartrain. In following the coast, the distance from the cape to Espiritu Santo, is about 330 miles, out of which 100 miles to St. Mark; from the same Cape to the western end of Lake Pontchartrain, the distance is about 305 miles. Cape St. Blas, therefore, lies at nearly equal distance from the two ends of the coast under consideration, and the bay of St. Joseph is central to Lake Pontchartrain and to the bay of Espiritu Santo.

St. Joseph's bay is nearly land-locked by the long and narrow peninsula, which, in a northerly direction, makes out of Cape St. Blas. It is sheltered from all winds. The bay has a width of three miles at its mouth, and about five miles in its greatest expansion between the peninsula and the main. Its elliptical form has a length of about fourteen miles from the mouth to the eastern end of the bay. A middle ground, over which nine feet can be carried in every direction, extends from the end of the peninsula to St. Andrew's bay. The channel leading into St. Joseph's bay is through this middle ground, and close round the point of the peninsula; it approaches the shore within about four hundred yards. The depth over the bar is seventeen and a half feet, at low tide, for a width of about two hundred yards, and on a length of about three hundred and fifty yards in the direction of the course of the channel. The bar lies about one mile east of the inner point of the peninsula. Within the bar, the bay affords from 25 to 33 feet of water, and may be considered as preserving a depth of 25 feet, on at least 8 miles up the bay: on this distance not less than 30 feet are found close to the inside shore of the peninsula. The mean rise of tide, from six days' observation, has been found to be 11 inches.

With regard to the middle ground, which stretches from the mouth of the bay to St. Andrew's bay, 9 feet can be deemed the least depth over it; but, at many places, the depth is as much as 15 feet.

The bay of St. Joseph may, at a future day, become of importance to our navy, on account of its central situation between Espiritu Santo and the

mouths of the Mississippi; and also, as being next to Pensacola, the best and most commodious harbor we have on this coast. It has over the bay of Espiritu Santo the advantage of a projecting position, and moreover of being susceptible of being defended. Indeed, whilst a permanent fort at the point of the peninsula, would, within a range of but 400 yards, interdict the channel to an enemy, one or two steam-batteries would hold out the middle ground, and prevent small vessels from entering the bay.

MAP XXI.—*St. Andrew's Bay* has its eastern entrance about 10 miles north-northwest of the bar of St. Joseph's bay; it is covered by Crooked and St. Andrew's Islands, which comprehend, between them and the main, St. Andrew's Sound, leading to the bay itself. These Islands may be considered as the continuation of the peninsula and middle ground of St. Joseph's bay.

There are three passes into St. Andrew's Sound. The eastern is through the opening between Crooked and St. Andrew's Islands; the depth is 20 feet on the bar, and the channel, close by the latter island, is contracted to the width of 300 yards; the distance between the islands is about 1200 yards. The Middle or Main Pass enters near the western end of St. Andrew's Island; the depth is 21 feet. The least width of the channel is 200 yards. The Western Pass is found to be about 2 miles west of the latter; the depth on the bar is 10 feet. The mean rise of the tide, for 7 days' observation, has been 11 inches. From this Western Pass to the head of the bay, the distance is about 30 miles. The bay itself is represented as shallow; but, inside of the sound, 18 feet can be carried from the Main Pass to Eastern Pass. From the western extremity of St. Andrew's Island to the eastern point of the peninsula, covering the sound up to the bay, the opening is 3¼ miles wide.

MAP XXII.—*St. Rosa Bay and Sound.* The entrance into this sound and bay lies about 85 miles west of Cape St. Blas, and 68 from the mouth of St. Joseph's bay. On the whole distance the sea shore is very bold, and the depth generally 4 fathoms, close to the land.

The pass enters between the eastern point of St. Rosa Island and the main; it is called Eastern Pass—it comes in from the south, and affords a depth of 8 feet on the bar. The channel is narrow, and the width, on the bar, for 8 feet depth, is about 150 yards. On account of breakers, this pass is not considered safe when southerly winds blow fresh; but, the winds being from the land, the channel is easy.

St. Rosa bay is the estuary of the Choctawhatchee and Ochchoycee rivers; its eastern, approaches within 5 miles the western end of St. Andrew's bay: both these bays are shallow, and represented to have but 4 or 5 feet water: 10 feet is the depth at the mouth of St. Rosa bay.

From the Eastern Pass to the western end of St. Rosa Island, the distance is about 45 miles. This long and narrow Island stretches, on the whole distance, parallel to the main, and covers the sound of same name; its western extremity shelters from the southerly winds the mouth of Pensacola bay. The sound affords an inland navigation for boats not drawing more than 4 feet. However, it must be remarked that, in summer, during the prevalence of constant southerly winds, 5 feet can be carried through from the Eastern Pass to the entrance of the Sound into the bay of Pensacola; but, in winter, when northerly winds are blowing fresh, only 4, and even 3½ feet can be carried through St. Rosa's Sound. Starting from the eastern entrance, the channel for 10 miles westward, is from ¼ to ½ mile wide. The two first miles afford a depth of 9 feet; but, at the end of this distance, a

shoal, 100 yards in length, obstructs the channel, and does not admit boats drawing more than 3½ feet when the tide is very low and much influenced by northerly winds: however, 4 feet may be assumed as an average depth. This shoal is represented as being the place where the two tides meet. Two miles west of the shoal, the soundings give 6 feet, and for two miles farther 7 feet, and 10 feet for the four following miles; thence a depth of 15 feet can be carried through a channel 10 miles long and about 1 mile wide: 10 feet, then, are found on a distance of 4 miles, but it diminishes to 6 feet over a shoal which obstructs the channel on a length of about 1 mile. From this shoal the depth increases gradually; and, in a distance of 7 miles, attains 13 feet. This latter depth may be carried to the bay of Pensacola, 8 miles westward. This description of the channel shows, that should the shoal just mentioned, and but 100 yards long, be improved, St. Rosa Sound would admit the passage of boats drawing between 5 and 6 feet. The several depths herein stated are those of low tide; the mean rise of which is about 10 inches.

Pensacola Bay.—This fine bay is the estuary of the Yellow-water, Middle, and Escambia river; it is sheltered from the northerly winds by the main, from the southerly winds by a spit of sand projecting from the main, as also by the western end of St. Rosa Island. Within this bay are those of Escambia and Yellow-water, and the Spanish cove called Careening Ground.

The channel entering Pensacola bay comes from south east and turns round a middle ground which projects nearly one mile to the south west from the point of St. Rosa Island; it then bends, to make for the bay, following a course east of north east. A bar, projecting about 2 miles to the south, and stretching from the western end of St. Rosa Island to the main opposite, has not, at low tide, more than 21½ feet, and even but 21 feet at the lowest tide. The width of the bar, in the direction of the channel, is 1 mile from the depth of 24 feet taken without, to the same depth taken within. The entrance of the bay, between St. Rosa Island and Foster Island, is 1¼ miles wide.

The interior of the bay affords a great depth of water and a good bottom for anchoring However, a considerable extent of its shores is shallow; but at some points a good depth is found within a short distance from land, viz: at the Careening Ground, 18 feet are found at about 50 yards from the shore; at Tartar's point, where now is erecting the Navy Yard, 30 feet are found within a few yards from the point, and 12 feet west of it; at the English Careening Ground, 18 feet can be carried close to the shore. The bay of Escambia is accessible for vessels drawing —— feet, and that of yellow-water affords —— feet. Respecting the narrow bay, called Great Lagoon, and entering the channel at Foster Island, it has, at its mouth, no more than 3 or 4 feet at high tide; having, however, a length of about 8 or 9 miles to the westward, and being separated from Perdido bay by a neck of land 1½ miles only wide, and about 8 feet above water. This lagoon offers a facility to connect, by water, the bay of Pensacola with that of Mobile.

The defence of the entrance of Pensacola bay, rests on the occupation of three points, viz: The western end of St. Rosa Island; Foster Island, which lies opposite, and stretches near the mouth of Great Lagoon; the bluff called the Barrancas. From St. Rosa Point to Foster Island, the distance is 1¼ miles. The channel passes within 500 yards from this Island, which must be considered as the chief position in relation to the defence of the channel. St. Rosa Point must co-operate with it, but cannot have the same full ef-

feet on account of the middle ground, in advance of the point, which obliges vessels to steer towards Foster Island, and to keep at a distance of about one mile from the point of St. Rosa, and within about 600 yards from Foster Island. Besides, from this island, vessels will be fired at when they turn round the middle ground, and bend their course to shift it gradually to the east of north-east.

St. Rosa Point, besides co-operating with Foster Island, will, in relation to the defence of the channel, have a cross fire with that of the Barrancas, and ensure more particularly, with respect to the navy yard at Tartar Point, the position from which this naval establishment might be bombarded. The distance from St. Rosa Point to the Barrancas is $1\frac{1}{4}$ miles; the channel, in its course above the middle ground, passes close round the point, and is no more than 900 yards for 24 feet depth.

The bluff at the Barrancas lies two miles west of Tartar Point; its elevation above the sea is 60 feet. Whilst this command gives to the bluff a great action over the channel, the distance from the navy yard renders the position extremely advantageous to protect, from an attack by land, the naval establishments; inasmuch as it also commands on the land side, and as such will be the right of a line of two or three small detached works, which, from the Barrancas to Bayou Grande, will place the navy yard beyond the reach of any land attack.

Though the bar, at the entrance of the bay, does not afford more than 21 feet water at low tide, and 23 feet at common high tide, yet Pensacola is the best naval station on the coast under consideration. With facility of defence and conveniency for naval establishments, it combines the advantages of being situate near the estuary of the Alabama and Tombeckbee rivers, and at a short distance from the outlets of the Mississippi, and of being susceptible (as it will be shown hereafter) of being connected, by an inland steam-boat navigation, with the Mississippi, at New Orleans.

Perdido Bay is the estuary of Perdido and Rocheblave rivers; it is represented as being deep, and having, at several places, bold banks; but its entrance into the sea is shallow, the bar is shifting, and affords but about four feet at high tide. From information, the entrance of the bay is liable to be entirely obstructed, and afterwards opened again; but the bay being separated by a neck of land, a few miles in width and a few feet above water, from the bay of Bon-Secours, in Mobile bay, it will facilitate the connexion of Pensacola and Mobile bays.

Mobile bay lies 40 miles west of Pensacola bay; it receives the Alabama and Tombeckbee rivers, the navigable waters of which flow through the State of Alabama, and will, by improvements in their head branches, connect the Southern districts of Tennessee, and the western of Georgia, with the Gulf of Mexico.

The entrance of the bay is between the eastern point of Dauphin Island and Mobile Point—the distance from one point to the other is $3\frac{1}{4}$ miles. A bank, projecting 5 miles to the southward of Mobile Point, obstructs the entrance of the bay; but, however, affords through it, various channels, the main of which offers, on the bar, $15\frac{1}{2}$ feet at the lowest tide, and comes from the south around Mobile Point. The interior of the bay has water enough for any vessel which can pass over the bar; but, on account of a shoal formed opposite to the mouth of Dog river, 11 miles south of Mobile city, vessels drawing more than eight or nine feet cannot, at low tide, ascend the bay further up and reach the mouth of Mobile river.

In following close to the out shore of Dauphin Island, and leaving to the east Big Pelican Island, vessels drawing 7 feet can, at low tide, enter the bay, in coming from the westward and steering close round a spit of sand, which projects out 1¼ miles from the eastern end of Dauphin Island; besides there is a good anchorage between Big Pelican Island and Dauphin Island, and, close to the latter, for vessels drawing 12 feet: this anchorage can be entered either from the westward, in steering close to Dauphin Island, or from the main channel, leaving it two miles south-west of Mobile Point. During a prevalence of northerly winds, vessels from the sea being prevented from entering the bay, this anchorage affords them a good shelter to wait for a favorable wind.

The main channel has a width of 1600 yards, for a least depth of 16 feet, opposite Mobile Point. Between this channel and Dauphin Island, vessels drawing 7 feet can, at high tide, pass, almost in every direction, over the banks which lie at the entrance of the bay. The mean rise of tide is 2½ feet.

A good anchorage is found at Navy Cove, north of Mobile Point, and vessels drawing 9 feet can reach, within four miles, the mouth of Bon-Secours river, which enters into the bay of the same name. It is through this river, as it will be said hereafter, that the bay of Mobile might be connected, by water, with the bay of Pensacola.

The defence of the entrance of Mobile Bay will rest on the occupation, by permanent works, of Mobile Point and of the eastern end of Dauphin Island. Whilst the former point will defend the main channel, the other will overlook the western pass, as also the anchorage between Dauphin Island and Big Pelican Island, and both together will, within their respective range, control, as much as practicable, the shoal, over which small vessels might enter the bay. The work at Dauphin Island will, besides, ensure the possession of the island, and prevent an enemy from making on it, in time of war, a permanent establishment. From such an establishment, a naval adversary might cut off the coasting navigation between Mobile Bay and New Orleans, through Lake Pontchartrain; and, moreover, blockade the bay and interrupt the extensive trade destined to be carried through this estuary of the Alabama and Tombeckbee rivers. In fine, the work at Dauphin Island will protect the anchorage of steam batteries, which might become necessary, in time of war, to scour the coast, to keep free the navigation of the sound leading from Lake Borgne and Lake Pontchartrain to Mobile bay; and, also, to prevent the blockade of the mouth of the Mississippi, as well as of the entrances into Lake Pontchartrain.

From Mobile Bay to the Rigolettes, (northern entrance into Lake Pontchartrain,) the distance along the coast is about 85 miles On this extent there is a sequel of islands parallel to the main, and forming a sound which procures a partial inland navigation from the bay to the lake. These islands are, Dauphin, Massacre, Horn, Dog, Ship, Cat, St. Joseph, and Aux Malheureux Islands. Pine Island, at the entrance of the lake into the Gulf, belongs to the fluviatic formation of the Mississippi, whilst the foregoing islands, with a sandy soil and a growth of pine, retain the geological features which the coast preserves generally from the Bay of Espiritu-Santo to Lake Pontchartrain, and even on the northern side of the lake.

Sound from Mobile Bay to Lake Pontchartrain. The islands just enumerated are separated by openings, which can be considered as entrances into the sound: we shall describe these entrances, as also the other passes which bear a relation to the navigation of the sound.

The sound enters Mobile Bay between the main and Dauphin Island: at this place, the bottom, formed of oyster banks, presents three shallow passes, viz—the Pass Aux Huitres, with a depth of three feet at high water; the Pass Guillori, two feet deep at common high tide; and the Pass au Héron, or Main Pass, having a depth of hardly five feet. The latter can be improved to a depth of eight or nine feet, and thereby rendered convenient for any vessel bound to Mobile city.

The entrance between Dauphin and Massacre Islands, is three miles wide and but five feet deep. That between the latter and Horn Island, has a width of two miles, and can be taken by vessels drawing ten feet. The distance from Horn to Dog Island is three miles; the pass is close to Horn Island, and has a depth of eighteen feet.

Between Dog and Ship Islands, the entrance is three miles wide; the bottom is represented as being shallow. The opening between Ship and Cat Islands is six and a half miles wide; the main pass has eighteen feet on the bar, and turns round the western end of Ship Island, leaving to the west a bank, which projects eastward, from Cat Island: vessels drawing twelve feet can pass over this bank. The entrance between Cat Island and St. Michael's Keys is three miles wide; and the channel is no where less than fifteen feet deep; but, within this part of the sound, vessels drawing more than eight feet cannot either reach the Aux Malheureux island, or steer to the eastward to pass between Cat Island and St. Mary's Key, or enter the Bay of St. Louis: thus, between the island Aux Malheureux and this bay, the sound becomes shallow and obstructed, besides, in this direction, by oyster banks and extensive shoals, on which the depth of water varies from three to eight feet. The impeded part of the sound, in the direction of Cat island and the entrance of the Bay of St. Louis, is called Pass Christian; and, as it has been said, does not admit the passage of vessels drawing more than eight feet, at medium tide. This draught of water can be carried to the entrances of Lake Pontchartrain, and through Lake Borgne. This lake, the western end of which is but fifteen miles from the city of New Orleans, can be considered as the termination of the sound under consideration. From Pass Christian to Pass au Héron, twelve feet can be carried through the sound in keeping on the island side, for the bottom of the sound is generally sloping from the main to those islands; but, on account of the shallowness of the entrance between Dauphin island and the main, vessels bound to Mobile, and drawing eight feet, must leave the sound between Massacre and Horn Islands, and shape their course for the main entrance of Mobile Bay.

Lake Pontchartrain is separated from Lake Borgne, and therefore from the sound just described, by Pine Island; to the north of which is the entrance called the Rigolettes, and to the south that called the Chef Menteur. These entrances and outlets afford, on their respective bars, in Lake Borgne, a depth of nine feet at high tide, and of eight feet at medium tide. This depth can be carried through the lake, within a short distance from shore; to Madisonville, to the mouth of the Manshuc, and to the debouch of bayou St. John, which connects the city of New Orleans with the lake. The middle of the lake is represented as deep, and affording, on an average, sixteen feet of water at a distance of about five miles from land.

Two permanent forts, just completed, defend the passage through the Rigolettes and Chef Menteur, and therefore protect New Orleans against any attack from that quarter. Besides, by preventing a naval adversary from

entering Lake Pontchartrain, this lake will offer a safe and commodious refuge to steam-batteries employed for the protection of the coasting navigation to Mobile bay, as also for the defence of the outlets of the Mississippi. It must be remarked that, by means of the contemplated canal, (the plan and estimate of which has been submitted by the Board, on the 1st of March, 1827,) destined to connect Lake Pontchartrain with the Mississippi river, near or at New Orleans, these steam batteries will be enabled to concentrate at any given point on the coast of Louisiana; and more especially at the passes of the mouth of the Mississippi, and in the bay of Barrataria.

The rivers emptying into the sound just described, are the Pascagoula, the Ocke-toussa, falling into the bay of Biloxi, the Nassouba-atcha, forming the bay of St. Louis, and the Pearl. The entrance of the latter river is represented as having a depth of nine feet on the bar; it is navigable, in time of freshets, for boats eight feet long by twenty feet wide, and drawing from eighteen to twenty inches: these boats can ascend as far up as the Agency, ten miles above Jackson. The bay of St. Louis can be entered by vessels drawing eighty feet, but six feet only can be carried up to the mouth of the river which forms its head: the same remark is applicable to the bay of Biloxi. With regard to Pascagoula river, it is much obstructed at its entrance into the sound: the eastern and middle channels have eighteen inches on the bar, the western three feet; the bar of the eastern is six hundred yards wide, that of the western four hundred and fifty yards; as to the bar of the middle, its width across is about one mile. Inside of the bars, seven feet is the least depth found.

From the mouth of Pearl river, the coast of the Gulf of Mexico continues to keep, to the bay of St. Bernard, a pretty straight course to the westward; except, however, on that portion where the Mississippi and its various outlets have progressively encroached upon the Gulf, by depositing into it the alluvion brought down by that magnificent river. The projecting portion of the coast, presenting a rich fluviatic formation, has justly, on account of its form, and of its analogy with the mouth of the Nile, received the name of Delta: the head is fifteen miles below Baton Rouge, its eastern side is bounded by Iberville river and Lake Pontchartrain, the western by Plaquemine and Alchapalaya rivers.

This portion of the coast is marshy, and generally overflown, at high tide, when southerly winds blow fresh; it can be approached, within short distance from shore, but by small boats, except at the various outlets which flow through the Delta, and empty into the Gulf. However, an excellent anchorage is found off the coast for vessels drawing as much as thirty feet; it lies north of the Freemasons' Island, and west of the northern Chandeleurs; the entrance is round the northern point of this island. This anchorage is accessible to vessels coming from the north, but cannot be entered from the south, at low tide, by crafts drawing more than six or seven feet.

The objects which, on this coast, claim, more particularly, a mention in the present report, are, the passes at the mouth of the Mississippi, and the Lake Barrataria.

The passes at the mouth of the Mississippi are five in number; viz: the Pass à la Loutre, which affords but six feet on its bar; the Northeast Pass, the depth of which is ten feet on the bar; the Southeast Pass, which has been for a long while the main pass, and has now but eleven and a half feet on its bar; the South Pass, represented as shallow, and affording but a few feet water; in fine, the Southwest Pass, now Main Pass, offers a depth of

fifteen feet on the bar, and even seventeen feet, when southwesterly winds are blowing fresh. At the fork of these channels, the trunk of the river presents a depth of six or seven fathoms; and the low and muddy marshes through which these outlets force their way to the sea, are generally overflown at high tide, and are then accessible to small boats.

(3.) MAP XXIII.—The Northeast, Southeast, and Southwest Passes have been, of late, examined and sounded by Lieutenant A. H. Bowman, of the Engineers; his memoir and draught are annexed to this report, and afford the data upon which rests the description of these natural channels in their actual state.

The Northeast Pass offers a depth of ten feet, on a distance varying from eighty to two hundred and fifty yards, across the bar; but, the latter being formed, at its top, of light muddy sediment, vessels drawing twelve feet, and either favored with a brisk breeze or towed by steam-boat, can furrow their course through this entrance. Immediately inside and outside of the bar, the depth increases rapidly: on the sea side, it attains twenty feet within a distance of about one hundred yards; and on the opposite side, seventeen feet within the same distance. The width of the pass is about eleven hundred yards, on the bar; the channel inside contracts itself to about four hundred yards.

The top of the bar on the Northeast Pass presents holes and small hillocks, near to each other; three of the latter are bare at low tide; they leave between them two intervals of about eighty yards in width each, and through which vessels drawing eleven and a half feet can pass, in just touching the bar: north of these hillocks, a depth of eleven feet is found on the bar; and the width, for such a draught, is at the least three hundred yards; therefore affording to vessels the facility of avoiding the narrow passages between the hillocks just mentioned. In this direction, the breadth, across the bar, is about three hundred yards; and fifty yards at the western end. A good breeze, or a towing steam-boat, can facilitate, through the Northeast Pass, the passage of vessels drawing thirteen and a half feet, by forcing them through the muddy deposite forming the top of the bar.

The Southwest Pass presents, at low tide, a depth of fifteen feet on the top of the bar, and on a width of about five hundred yards across it. A depth of five fathoms is found at the distance of three and a half miles inside of the bar; hence the bottom rises gradually towards the top of the bar, and thence falls rapidly, within a distance of but a few hundred feet to the depth of five fathoms. The top of the bar is made of irregular elevations and depressions: small hillocks rising near to the surface of the water, and holes sinking to the depth of several feet, are found in the immediate vicinity of each other. It is, perhaps, owing to this irregular relief, that this top has received from the pilots the name of *Pink*. The hillocks are composed of soft blue clay, mixed with a very small portion of sand—they are constantly shifting; the sides of the holes are formed of a much harder clay, and contain more silex than the hillocks. It is to be remarked, that an obstacle being opposed to the current, water moving them with greater rapidity round the obstacle, creates a hole in the top of the bar, and causes the rising of a corresponding bank.

The soft substance forming the Pink, or top of the bar, permits, at high tide, or when the wind blows fresh from the southwest, to vessels drawing seventeen feet, to force their way through the Southwest Pass.

One mile and a half above the bar, a western channel, called Nine Feet Channel, makes from the sea into the Southwest Pass; a bar, formed at their meeting point, has a depth of twelve feet on a distance of three hundred and fifty yards across. From fifteen to eighteen feet are found outside of the bar of this Nine Feet Channel.

Three islands, lying near these entrances into the Mississippi, deserve some notice, as having been pointed out either for the erection of a light-house, or to receive naval stores. These islands are—Pelican, Bacchus, and Scott's. The former lies east of the Southwest Pass, and about six hundred yards from the bar; it is a bank of mud, six feet above the medium level of the river, rapidly washing away, and this, especially, by the prevalence of the southerly winds. Its yellowish soil is an aggregate of small prisms of indurated clay; and is cut off by deep fissures, which precludes the erection of any building. The island cannot be approached by small boats, except during high tide or a heavy swell. All the other islands east of the Southwest Pass are of the same description as Pelican island.

But the islands on the western side of the Nine Feet Channel, namely, Bacchus' and Scott's islands, are of different characters. The former, seven feet above the medium tide, has its soil composed of blue and yellow clay, mixed with sand and vegetable mould—it is covered with a luxuriant growth of grass. The substratum is a blue clay, without any perceptible mixture of sand. The banks are well protected from the action of the waves, and do not appear to have received any recent injuries; they can be approached within a hundred and fifty yards by vessels drawing twelve feet, and crafts drawing four feet can lie along side of the shore.

Scott's island can be approached but by small boats, and, otherwise, presents the same characters as those assigned to Bacchus' island. Both might admit the erection of buildings, and afford good clay to make bricks: sand is found in abundance on the opposite middle ground.

Immediately below these two islands is another, larger, higher, and better situate for a light-house; but it is interspersed with salt springs, which would prove inconvenient during the laying of any foundation. The springs rise to the surface of the ground, and discharge their waters at an elevation of eight feet above the level of medium tide. These waters bring up, mixed with them, a kind of black mud, which forms deposites around the mouth of the spring, and raises a cone, through the vortex of which emerge the waters. Some of the cones are several feet higher than the level of the island; and a stick seventeen feet long has been thurst into one of them without meeting great resistance.

The periodical rise caused by freshets in the Mississippi, is not felt at its outlets into the sea; but the latter are effected by the tide, which alternately rises and falls, commonly two feet for every six hours. However, these rise and fall are not constant, and are much influenced by the winds. When the river is at its lowest stage and the wind favorable, the tide is felt as high up as Baton Rouge, about one hundred and seventy miles in a straight line from the mouth of the river. Respecting the periodical rise and fall of the Mississippi, they do not take place at certain fixed epochas, for this reason, that the causes which produce the rise, that is to say, the freshets in the tributary streams, are variable in their partial and general effects; however, the month of November can, on an average, be considered as the epocha of the beginning of the rise, and the month of May as the epocha of the beginning of the fall. Sometimes in summer, between these two epochas, incidental

rises are felt; they are owing to the occasional discharge of freshets from some individual tributary.

On account of the low and marshy ground, which extends thirty-two miles along both sides of the river, from its mouth up to the turn of Plaquemine, the Mississippi cannot be defended at its very entrance into the Gulf. It is but at Plaquemine where the erection of permanent works of defence is practicable. There a fort is now about to be finished, on the right bank; it will have a cross fire, with a fort extant on the opposite bank, and to which indispensable improvements are to be made. The distance from one fort to the other is about one thousand three hundred and ninety-seven yards, the width of the river about six hundred and fifty yards.

Bay of Barrataria.—Whilst Lake Borgne, on the north of the river, receives all the outlets through which New Orleans can be approached, the Bay of Barrataria is, on the south, the estuary of all the water courses which lead to the Mississippi opposite New Orleans. This bay is about ten miles wide, in every direction; its depth varies from six to twelve feet; on the seaside, it is covered by Grand Terre island, which leaves between it and the main two entrances. The eastern is filling up, and can, at low tide, hardly admit the passage of small boats; the western, called Grand Pass, affords on its bar a depth of nine feet at common tide; the channel passes within about two hundred yards from the western end of Grand Terre island, and is at this distance but fifty yards wide.

A fort has been planned and recommended on the western end of Grand Terre-island; it will secure to our coasters the anchorage into the lake, and shelter New Orleans against any hostile attempt from that quarter. These two objects will acquire much importance by taking into consideration that, by cuts averaging together perhaps, no more than ten miles, a commodious, water communication for sloops can cheaply be made from the bay to the Mississippi, opposite New Orleans; which, being opened, would render this bay a dependency of the port of New Orleans, in relation to the trade with Tampico. Through this channel, vessels engaged in this trade would avoid the circuitous route of the Mississippi.

Such a water communication, combined with the canal already mentioned, from New Orleans to Lake Pontchartrain, would link together this lake with the trunk of the Mississippi and the bay of Barrataria, and thus establish an inland navigation, which, with the assistance of telegraphic stations, would afford, in time of war, every facility to concentrate rapidly, at any point, the troops and steam batteries destined to oppose any hostile operation in that quarter.

Surveys and Levellings executed by Major Perrault's Brigade.

General Map.

Amongst the surveys more particularly designated in the resolution of Congress, above recited, were those relating to a route of canal from St. Mary's river to Appalachicola bay, and to another from St. John's river to Vassasousa bay. These two routes, pointed out by the hydrography of the peninsula, have proved to be those which were to be surveyed to ascertain the degree of practicability of the object contemplated, and to facilitate the investigations leading to the selection of the route to be recommended.

We shall, therefore, give successively the description of the surveys executed along these two routes, and of those performed, as experimental, in other directions.

St. Mary's route.

Maps xxiv. xxv. This route of canal commences at Bell river, five miles above the entrance of this arm of the sea into St. Mary's river, and thence ascends to the head of Alligator creek, one of the upper branches of St. Mary's river; from this point, it runs through the Okefenoke swamp, to cross afterwards, in succession, the Upper Suwannee, the Alapaha, and the Withlocoochy river above its entrance into the Suwannee. Here the route takes its course to the Ausilla river, and thence descends to St. Mark, to follow, afterwards, the general direction of the coast, in order to reach the bay of Appalachicola and terminate into it.

From the eastern end, in Bell river, to the point where the line strikes St. Mary's river, having avoided the bend of Trader's Hill, the distance is 28 miles; this river, at the crossing point, is 15 feet above the level of low tide in St. Mary's harbor, but the intervening ground between the 22d and 23d miles, is as much as 100 feet above the same level. The river has yielded, at this place, 115 cubic feet of water per second, and this supply would be much greater during the rainy season; however, such as it is, it would be sufficient to feed a long section of canal.

With a view to avoid the circuitous route of the river from the crossing point to the fork at the mouth of Alligator creek, a more direct line of levels has been run to this fork. It crosses again St. Mary's river a little below Alligator creek, at the 42d and a ¼ miles from Bell river. The distance between the two crossing points is 14¼ miles, which would have been about 38 miles in following the banks of the river, but the intervening ground is much elevated, and, at the 33d mile, is 152 feet above low tide in St. Mary's harbor, and 34 feet above the river at the fork. At this second crossing, the St. Mary's has yielded $11\frac{43}{100}$ cubic feet of water per second, and was then deemed to be at its common stage; this supply would be inadequate to fill 14¼ miles of canal.

From the fork, which is 118 feet above low tide, the line ascends Alligator creek, and reaches, through the Okefenoke swamp and near the 55th mile, the summit point between the Atlantic and the Gulf of Mexico: this point is 152 feet above low tide. No natural reservoir, of consequence, is to be found in the vicinity; therefore, should a canal have to pass through this route, it would become necessary to have the summit level with such dimensions as to be itself a reservoir, which would be supplied by the draining of the extensive swamps stretching across the heads of St. Mary's river and the Upper Suwannee. From the fork to the summit point, the distance is 12¾ miles, and to the first crossing, above Trader's Hill, 27 miles; the reservoir would have, therefore, to feed 27 miles of canal on the eastern side of the peninsula.

Respecting the nature of the ground through which runs the eastern section of St. Mary's route, it is uniformly light sand, interspersed with swamp soil when approaching the head of the stream; however, some clay mixed with a great deal of sand, forms generally a substratum, lying, on an average, 8 or 10 feet beneath the surface of the ground. Thus, the river St. Mary's has to force its way through sandy strata, and does not afford any

flat bottom of consequenee; a circumstance which, added to the long and circuitous course of the stream, would oppose difficulty and inconvenience to the location of a canal along the banks of the river.

Ten miles farther than the summit point, the line crosses, at the 65th mile, the Little Suwannee, which runs in a northwesterly course; and, at the $73\frac{1}{2}$ mile, it intersects the Suwannee, $112\frac{1}{2}$ feet above low tide in the Atlantic. This river, in ordinary times, yields, at this point, 614 cubic feet of water per second. This is the first supply to be procured on the western side of the ridge from the summit point, (55th mile,) that is, on a distance of $18\frac{1}{2}$ miles. This portion of canal, added to the 27 miles on the eastern side, make $45\frac{1}{2}$ miles of canal, which, as to water, should depend entirely upon the artificial reservoir mentioned above.

The line continues on to the Alapaha river, the left bank of which it intersects at the $94\frac{1}{2}$ mile, 95 feet above the level of low tide in the Atlantic. The Alapaha sinks at about 7 miles above the crossing point of the canal route: in rainy season the subterranean passage, or *sink*, cannot vent all the water, the surplus overflows into the Suwannee; but, in dry season, this stream, below the sink, is dry, and could not afford any supply to the canal.

Maps xxvi. xxvii. xxviii. From the Alapaha to the Withlocoochy, the distance is $10\frac{3}{8}$ miles; the line intersects the left bank of the stream just above its mouth, into the Suwannee, at a point $104\frac{3}{8}$ miles from the commencement, in Bell river, and 80 feet above low water mark in the Gulf of Mexico.

Here we must observe, that the survey of the route under contemplation has been made by two parties: one of which has performed the operations from the Alapaha eastward to the Atlantic, whilst another was executing those from the same river westward to the Gulf. A bench mark has been fixed on the Alapaha to connect the levellings of both parties: this bench mark has been found, by the eastern party, to be 95 feet above the level of low tide in the Atlantic; and by the western party, but $91\frac{45}{100}$ feet above low water-mark in the Gulf. The difference is $3\frac{55}{100}$ feet, to which we allude, at present, in order to be distinctly understood, when mentioning an elevation, either above the Atlantic or above the Gulf. We shall return to this subject when describing the route through the St. John's.

The Suwannee, at the mouth of the Withlocoochy, has yielded as much as 3,029 cubic feet of water per second. The elevation of the surface of the water above the Gulf, is 54 feet in the survey No. xxv. and 47 feet on that of No. vii.; such a difference might be accounted for by supposing the river to have been at different stages of water at the time of these two surveys.

After having crossed the Withlocoochy, the line of levels takes its direction towards St. Mark, and intersects the Ausilla at a point $43\frac{6}{8}$ miles from the Withlocoochy, $148\frac{1}{8}$ miles from Bell river, and elevated 47 feet above low tide in the Gulf. This point, assumed at the surface of water in the stream, is 33 feet below the termination of the line on the left bank of the Withlocoochy, and but 8 feet below the level of water in this river at the time of the survey; therefore, on a distance of $43\frac{6}{8}$ miles, a fall of 8 feet only has been obtained: a circumstance which shows that the line has been taken through a very high ground. Indeed, in reckoning the distance from the Withlocoochy, the general level of the ground on the 20 first miles averages 117 feet above the Gulf, and 62 feet above water in the Withlocoochy; on the ten following miles, the general level of the ground is, on an

average, 146 feet above the Gulf, and 91 feet above water in Withlocoochy: It is to be remarked that this elevation is, within a few feet, the same as that found at the summit point (55th mile,) between the Atlantic and the Gulf. In fine, the $13\frac{6}{8}$ last miles present, on an average, an elevation of 80 feet above the Gulf, and 25 feet above water, at the mouth of the Withlocoochy.

Hence it follows, that this line of level, $43\frac{6}{8}$ miles in length, is utterly unfit for a route of canal. If it had been run more to the south, with a view to descend into the Gulf, and to keep the several levels below the surface of the Suwannee at the mouth of the Withlocoochy, these rivers could have been used for supplying the canal down to the Ausilla.

At the crossing of the Ausilla, the river has yielded, in dry seasons, $217\frac{8}{10}$ cubic feet per second.

From this point the line should have descended the Ausilla, in order, afterwards, to follow the low land between this river and St. Mark; but instead of this, the line continues on, through a very high and most unfavorable ground, to a point $14\frac{6}{8}$ miles from the Ausilla, $162\frac{1}{8}$ from Bell river, and 35 feet above the Gulf. On this distance of $14\frac{6}{8}$ miles, the general level of the ground averages 182 feet above the Gulf, and $33\frac{1}{2}$ feet above the summit point of the whole route at the 55th mile: and, on a length of about 4 miles, the elevation of the ground above the Gulf varies even from 195 to 212 feet.

From the point, $162\frac{1}{2}$ miles from Bell river, the line of levels keeps on pretty even ground to its termination into the river St. Mark, 500 yards below the fort of the same name, and $183\frac{3}{8}$ miles from the eastern end of the route into Bell river. On this portion of $21\frac{3}{8}$ miles the descent is 35 feet; and if it be remembered that the Suwannee, at the mouth of the Withlocoochy, is but 55 feet above the Gulf, it follows, that from this point ($104\frac{3}{8}$ miles from Bell river,) to that $162\frac{1}{8}$ miles from Bell river, the line after having ascended to 212 feet above the Gulf, has, however, afforded, in relation to the object contemplated, but a descent of 20 feet towards the Gulf, on a distance of $57\frac{6}{8}$ miles.

From the foregoing description, it is obvious, that the line of levels from the mouth of the Withlocoochy to St. Mark, has been selected and carried without regard to a route of a canal between these two points: favorable ground and supply of water having been lost sight of. The topographical features of this district of Florida show distinctly, that a route south of the line surveyed, would have met with lower ground, afforded facility to use the Suwannee and the Ausilla as supplying streams; and, in fine, it would probably have procured a shorter line, by leaving entirely to the north the rising spur upon which stands the district of Tallahassee.

As stated above, the distance from Bell river to St. Mark river is $183\frac{3}{8}$ miles, in following the line just described; but, in order to conform to the resolution of Congress, this line has been continued to the bay of Appalachicola.

Maps xii. xiii.—This continuation commences at a point on the western bank of St. Mark river, 550 yards below fort St. Mark; hence it follows the general direction of the coast, and debouches in the Sockochoppe creek, at the head of Ocklockony bay. The distance is $19\frac{1}{2}$ miles; the summit point of the ground is at the 11th mile from St. Mark river, and is 40 feet above low tide: however, $20\frac{3}{8}$ feet can be considered as the mean elevation on the whole distance. Respecting the ground through which the line runs, it is generally sand barren, interspersed with hammocks and savannas.

MAP XIV.—From Sockochoppe creek to the entrance of Crooked river into Ocklockony river, the communication might either cross the bay and ascend the latter river, or, by means of a cut $\frac{5}{8}$ of a mile in length, ascend Sockochoppe creek and enter Ocklockony river at its elbow, 3 miles above its mouth. From the point to the termination into Sockochoppe creek, the distance will be $1\frac{5}{8}$ miles, and to Crooked river $4\frac{4}{8}$ miles: whole distance from the termination into Sockochoppe creek to Crooked creek, $6\frac{1}{8}$ miles.

MAP XIV.—Crooked creek connects Ocklockony river with New river, and can afford, at low water, a depth of 5 feet throughout: but the windings of this creek are numerous, and would about double the distance between the two rivers. Consequently, a line of levels has been run along the northern bank of Crooked creek. It passes, alternately, through cypress swamps and pine barren; its length is $12\frac{7}{8}$ miles, and terminates $3\frac{1}{2}$ miles above the mouth of New river in St. George's sound. Through the windings of crooked creek, the distance would be upwards of 20 miles; but though the surveyed line is much shorter, yet it would have been desirable that a more direct one should have been tried between the two rivers.

MAP XIV.—A line of levels, parallel to the general direction of the coast, has been surveyed from New river to the bay of Appalachicola. It passes through a sandy soil, covered with pine and interspersed with many cypress swamps and bay-galls; it crosses no stream of any consequence. The greatest elevation of the surface of the ground above low tide in the Gulf is 33 feet, the distance from New river to the bay is $15\frac{5}{8}$ miles. On the ten first miles the average elevation of the ground, above low water in the Gulf, is 22 feet, and for the remainder 32 feet.

Summing up these several lines of levels, the distance from St. Mark to the bay of Appalachicola is found to be $54\frac{1}{8}$ miles, or about 55 miles, in taking into account the crossing of St. Mark and New rivers. This distance, added to the $183\frac{3}{8}$ miles, from Bell river to St. Mark, gives $238\frac{3}{8}$ miles for the whole length of the line from Bell river to the bay of Appalachicola.

We shall now pass to the description of the St. John's route.

St. John's route.

This route, destined, according to the resolution of Congress, to connect St. John's river with Vassasousa bay, commences at the mouth of this river on the Atlantic, and terminates at the mouth of Suwannee river on the Gulf of Mexico. It ascends the St. John to the mouth of Black creek, and reaches, at Kinsley's pond, the head of this tributary; hence, in its course to Sampson's pond, it crosses the Florida ridge, and then descends Santa Fé river to its mouth in the Suwannee: from this point it follows the river down to its entrance into Vassasousa bay.

Should a water communication only be required in this direction, the St. John's and Black creek, on the eastern side of the ridge, would, without any improvement, afford a section of nearly 60 miles, navigable, at low tide, for boats drawing $6\frac{1}{2}$ feet, viz: from the mouth of the St. John's to that of Black creek 47 miles, and from this point to the upper fork of Black creek $12\frac{6}{8}$ miles. On the western side of the ridge, the Suwannee could, from the mouth of the Santa Fé to Vassasousa bay, a distance of 55 miles, offer a natural channel for boats drawing $6\frac{1}{2}$ feet—the bar at the mouth of the Suwannee being improved; for it has been already stated, pages 6 and 7, that the depth on this bar was but four feet at low tide and $5\frac{1}{2}$ feet at high

tide. This distance of 55 miles, being added to that of nearly 60 miles on the eastern side of the ridge, will make 115 miles of natural water communication, in the direction under consideration, between the Atlantic and the Gulf of Mexico. A canal 74⅝ miles in length, would complete this water communication, the whole length of which would be almost 190 miles.

In a former subdivision of this report, we have described the St. John's, Black creek, and the Suwannee, in relation to the facility they afford to a navigation for sea vessels or boats; we shall now enter into the details of the route of canal, tried by surveys from the mouth of the St. John's to that of the Suwannee.

Map 1.—The first section is from the mouth of Black creek to that of the St. John's. It commences at a point opposite to Black creek, and where the nine feet channel of the St. John's comes near to the eastern bank of the river; and it terminates at the mouth of Pablo creek, two and six-eighth miles above the entrance of the St. John's into the sea. On account of almost impassable swamps, the line of levels has not been run altogether straight; indeed, these swamps and pine barren form the main features of the country through which this survey had to be made. The four first miles keep within a mile of the St John: some small gulleys emptying into the river are crossed by the line; Julington creek is crossed at the sixth and a half mile, and at a point where the depth is eleven feet. Hence the line crosses in succession, at the ten and a half mile, Will's swamp, head of Davies' creek, upper branch of Julington creek; and at the eleventh mile, King's road, leading from Jacksonville to St. Augustine. The remainder of the line pursues its course between the heads of Potsburg creek and Pablo creek, intersects Maxey's creek about two miles above its mouth, and, after having followed along this creek for one and a quarter miles, takes a direct course to the mouth of Pablo creek. This line has a length of twenty-six and a half miles; the summit point is at the nineteenth mile; its elevation above the level of low tide is fifty-three feet: the average elevation of the line above the same level is twenty-eight feet.

In following this route, the distance from the mouth of Black creek to that of the St. John would be thirty-one and a half miles, whilst it would be forty-seven miles through the natural channel of the river; but the great expense in which this section of canal would involve, will, in the sequel of this report, lead to investigate which of these two water communications should be recommended.

Maps 1. III.—The second section of the St. John's route commences at the outlet of Sampson's pond, and terminates into the St. John's, at the mouth of Black creek: the distance is thirty-eight miles.

The portion between Sampson's pond and Kinsley's pond, runs from the outlet (Sampson's river) of the former to the outlet (north prong of Black creek) of the latter pond. It ascends Alligator creek to its head, and hence descends into Kinsley's pond; this dividing point is one mile west from this pond, and seven miles east from Sampson's pond; its elevation above low water in the Atlantic is two hundred and thirty-seven and a half feet; above Kinsley's pond, sixty-six and a half feet; and above Sampson's pond, one hundred and eleven and one-tenth feet. This shows that Kinsley's pond is forty-four and six-tenths feet above the level of Sampson's pond. The length of this portion of route will be thirteen and one-eighth miles, including the distance of four and six-eighth miles through the pond.

On account of the swamps which surround the south and east sides of Sampson's pond, the line of levels has been surveyed from the north side to Alligator creek, and hence through the best ground, to Kinsley's pond.

The summit level of the St. John's route is to be found between these two ponds. If Kinsley's pond could afford a sufficient supply of water, it might be assumed for the summit level of the canal; and by means of a cut three and one-eighth miles in length, sixty-six and a half feet deep at the highest point of the ground; but, on an average, thirty-eight feet above the water line in the canal, the head waters of Black creek would be connected with those of Santa Fé river. But Kinsley's pond, with a superfices of seven million seven hundred and fourteen thousand square yards, and an assumed depth of six feet, is not sufficient (as it will be proved hereafter) to supply, throughout the year, the lockage of the summit level, and to feed about twenty and a half miles of canal, from Sampson's pond to the fork of Black creek. On this score, it must be observed that, in a country like Florida, where occurs no hard frost, a canal must be navigable throughout the year; and, consequently, requires an uninterrupted supply of water; leaving thus no period during which, as in northern climates, reservoirs are usually replenished.

This circumstance will make it indispensable to keep the summit level still lower, to assume Sampson's pond as its main reservoir, and to consider Kinsley's pond but as an important auxiliary. The superfices of Sampson's pond has been stated to be 16,362,777 square yards, and its assumed depth eight feet; therefore, its superfices added to that of Kinsley's pond, will be about 24,000,000 square yards. The whole water of these ponds will not be available, as we can rely but on the portion which is replenished yearly by rain and filtration, and which amounts, as computed hereafter, to 32,000,000 cubic yards. With regard to Pithlacoocho lake, Alachua savanna and Orange lake, which are respectively 76, 78, and 85 feet below Sampson's pond, they can be used but to supply inferior levels on the eastern side of the ridge; and even their distance to the canal would necessitate expensive feeders through sandy ground and limestone strata, which would cause an uncommon loss of water by filtration.

The foregoing considerations show that there is no alternative, and that the summit of the St. John's route must be taken on such a level as to receive its main supply from Sampson's pond. Assuming the bottom of canal 10 feet below the surface of the pond, or 116 4-10 feet above the Atlantic, the cut through the ridge would be 16 miles in length; the depth at the summit point of the ground, would be 121 1-10 feet; and the main depth, on the whole distance, 43 feet.

We shall enter into more details respecting this portion of canal, when investigating hereafter the two routes under consideration; we shall now continue the description of the section of the St. John's route.

From Kinsley's pond to the fort of Black creek, the line of levels descends the valley of Bull creek, leaving to the west the long winding north prong of Black creek, to meet it again at its embranchment with the south prong of Black creek. The fall from the pond to this point is as much as 166 feet, on a distance of but 12⅛ miles; indeed, at this embranchment, or fork of Black creek, the rise of tide is felt by about one foot, as we have stated before.

This line of levels crosses twice the bed of Bull creek, and, having intersected Mill creek, rises suddenly between the 21st and 22d miles, to the

elevation of 95 feet above the terminating point, into Black creek. This shows that a proper attention has not been given to the object for which this line was intended: it is a line of levels, whilst it should have been a route of canal.

Map i.—In conformity with the instructions of the Board, the line should have been continued along Black creek, but the cypres swamps, as also the steep and sandy bluffs along the margin of the stream, are very unfavorable to the location of a canal parallel to its course; a consideration which, added to an increase of distance, caused by the great bend of Black creek, has likely induced the officers intrusted with the survey, to try a direct line from the fork to the mouth of Black creek. A route of canal, in this direction, crosses no water courses from which to derive any supply. The summit level, or reservoir, if practicable, in the valley of Bull creek, might be resorted to; but both, very likely, would prove inadequate. At all events, the line ought to have been continued up to Bull creek, in order to connect it with the levels east of Kinsley's pond; for it is obvious, that from the 19th mile to the fork of Black creek, the line, in regard to a canal route, has no relation whatever with the route tried from this fork to the mouth of Black creek. Indeed, this route, 9 miles in length, presents an average elevation of no less than 50 feet above low tide in the Atlantic, 45 feet above low water mark at the fork of Black creek, and 44 feet above the entrance of Bull creek into the south prong of Black creek. In following the margin of Black creek, the distance would have been $12\frac{6}{8}$ miles, and the whole section, from the outlet of Sampson's pond to the St. John's, 38 miles.

Maps viii. ix.—The third section of the St. John's route commences at the outlet of Sampson's pond, or head of Sampson's river, and terminates at the entrance of Santa Fé river into the Suwannee: the distance is $49\frac{4}{8}$ miles. The level of the pond has been found, at its outlet, $123\frac{77}{100}$ feet above low tide, in the Gulf of Mexico; whilst its elevation above low tide in the Atlantic has been stated to be $126\frac{40}{100}$ feet: difference, $2\frac{63}{100}$ feet. Therefore, should the surveys be perfectly accurate, the level of low tide in the Gulf would be $2\frac{63}{100}$ feet above that of low tide in the Atlantic. On another hand it has been shown, in describing the surveys relating to the St. Mary's route, that the result of the levelling has given $3\frac{55}{100}$ for the difference of the level between the Gulf and the Atlantic. We must therefore consider it as probable, that, at low tide, the elevation of the Gulf at the mouth of the Suwannee, is not more than 3 or 4 feet above low tide at the entrance of the St. John's into the Atlantic, and that such might be the limit of the rise caused, at this point of the Gulf, by the tropical trade wind.

It is well known that this perpetual wind, to which, by illusion, we assign a direction from the east, is caused by the currents of air coming from the poles to renew between the tropics the lower atmosphere, rarified by a perpendicular sun. These currents having a velocity from west to east, less than that of the surface of the earth near the equator, we feel against our rotary motion, from west to east, a resistance which seems to us to come from the east, on account of our illusive consciousness of being motionless. The surface of the sea, in meeting, between the tropics, this mass of air brought by the current from the poles, is, by the same cause, swelled to the west. This rise is more especially felt on that portion of the ocean, comprehended between the West India Islands and the American continent. Here the swell has but an issue to fall from its level out of the tropical region; this issue is through the strait of St. Antonio, formed by the eastern point

of Yucatan and the western point of Cuba, and hence into the Atlantic, between Cuba and Florida. This fall, it is well known, forms the head of the stupendous Gulf stream. Now, we can observe that the Gulf of Mexico lies without of the tropical region, and that the north of it is sheltered, by the peninsula of Florida, from swells from the east; consequently, its level, though by an influx of water from the strait to St. Antonio, kept higher than the Atlantic, yet must necessarily be much lower than the surface of the sea, between the Island of Cuba and the Bay of Honduras. Therefore, the Gulf of Mexico, being not under the same influence as the portion of sea, forming in some sorts, between the West India Islands and the main, the upper reservoir of the Gulf Stream, it cannot be expected that its rise should be the same; and we consider as probable, the rise of 3 or 4 feet, afforded by the surveys under consideration.

The line of survey from Sampson's pond to the mouth of Santa Fé river, is but a line of levels, and not a route of canal; to be such it should have been necessarily carried along the margin of the stream. But great difficulty, expense and delay would have been encountered, by keeping a course through the cypress swamps, which hem the bed of the river; considering, therefore, the survey as preliminary, the line has been generally carried along the edge of the swamps. Commencing at the outlet of Sampson's pond, it follows, for nearly $1\frac{2}{8}$ miles, the eastern margin of Sampson's river; and it crosses it and runs through an extensive palmetto flat, swampy and interspersed with pine barren, ponds and bay galls, and intersects Santa Fé river at Rocky Ford, $10\frac{4}{8}$ miles from Sampson's pond. At the time of the survey, Sampson's river, at the crossing point, has yielded $88\frac{32}{100}$ cubic feet of water per second; but during three or four months in the year, it is entirely dry.

The level of the bottom of canal, assumed 10 feet below Sampson's pond, would meet the bed of Santa Fé river, at about 3 miles above the point where the line strikes this river; and about $7\frac{4}{8}$ miles from the pond; this distance being added to that of 16 miles from Sampson's pond to Bull creek, makes about 24 miles for the whole length of the summit level of the St. John's route.

The Santa Fé river, at the crossing point, has yielded $176\frac{6}{10}$ cubic feet of water per second; the level, at the time of its measurement, was $11\frac{2}{10}$ feet below high water mark.

From Rocky Ford the line of levels is carried on the southern side of the Santa Fé, to a point *a*, opposite the lower end of the Natural Bridge: the distance is $15\frac{6}{8}$ miles. A line of canal between these two points would have to be kept close to the margin of the river, in order to avoid the hilly ground exhibited by the survey.

The same remarks are applicable to the line run from opposite the lower end of the Natural Bridge, down to the entrance of Santa Fé river into the Suwannee. However, on this portion, $23\frac{2}{8}$ miles in length, the ground is not so hilly, and its slope, generally, is more gradual; which shows that a route of canal following the southern margin of the river would not meet with great difficulty.

The mouth of the Santa Fé, at the time of the survey, has been found to be 10 feet above low tide in the Gulf, (the survey No. VI. gives 13 feet,) and, therefore, $113\frac{77}{100}$ feet below the level of Sampson's pond. By assuming the summit level 10 feet below the surface of this pond, the fall from said summit level to the mouth of Santa Fé river will be $103\frac{77}{100}$ feet,

and 113 $\frac{77}{100}$ feet, the whole fall of the canal on the western side of the ridge. It must be remembered, however, that, at the mouth of the Santa Fé, the rise caused by freshets is about 15 feet. Here the elevation of Sampson's pond, above low tide in the Gulf, has been assumed at 123 $\frac{77}{100}$ feet. (Page 30.)

This third section of the St. John's route passes through a country covered with pine barren, interspersed with thick hammocks, lying more especially on the river, and on the small tributary streams. The substratum is limestone, and the *sinks*, which frequently occur at the surface of the ground, give much to apprehend as to the practicability of having a canal water-tight, without great expense, for stopping the considerable leakage which will take place. The loss of water being so much the more to be prevented, as this section of canal will have to be supplied altogether from the Santa Fé, there being no tributary of any consequence on the southern side of the river.

Maps iv. v.—The fourth section of the St. John's route has a southerly direction from its commencement, at the mouth of the St. Fé, to its termination into Vassasousa Bay, at the mouth of the Suwannee. The fall on this section, being but 10 feet at low stage of water in the Suwannee, this river affords the cheapest channel to descend from the third section into the Gulf; for it must be remembered that the navigation of the Suwannee, below the mouth of the Santa Fé, is free from obstructions of any kind, and that 12 feet is the least depth which can be carried down to the mouth of this river, on a distance of 55 miles.

However, according to instructions of the Board, a line of levels has been carried along the banks of the Suwannee, from Indian Cowpen, up to the mouth of the Santa Fé. It had been contemplated to have had this line run from the very mouth of the river; but the extensive swamps which, on each side, below Indian Cowpen, hinder the approach of the river, have obliged to commence the survey at Indian Cowpen. This circumstance is, however, of little consequence, because the Suwannee, at Indian Cowpen, can be considered as being but 2 or 3 feet above low tide in the Gulf, when the river is at its lowest stage; the rise caused by freshets, is about 8 feet.

The levels from Indian Cowpen to the mouth of the Santa Fé, comprehend a distance of 29 miles, through a pretty flat pine barren, whose elevation above low tide in the Gulf, varies from 15 to 50 feet; on this distance, the line crosses no tributary of any importance. The lime-stone substratum found along the Santa Fé, continues on each side of the Suwannee.

This experimental survey shows that, by a proper selection of the ground favorable to a minimum excavation, a route of canal might easily be located on the eastern side of the Suwannee; and taking into consideration the inconsiderable fall of the Suwannee, from Indian Cowpen to the Gulf, as also the difficulty of passing through the extensive swamps just mentioned, we think that the western termination of the St. John's route must be at Indian Cowpen, 20 miles above the mouth of the river.

The latter distance has been obtained by coursing the river, and the same mode of measurement has given 35 miles from Indian Cowpen to the mouth of the Santa Fé; a distance which is but 6 miles greater than that exhibited by the line of levels run between these two points. This difference is an advantage in favor of a canal along the river, but rather too inconsiderable to compensate for the expense which the construction of such a canal would involve. Therefore, the St. John's route might have its western termination at the mouth of the Santa Fé, and its eastern commencement at the fork of

Black Creek, thus connecting the St. John's with the Suwannee, by a canal $74\frac{6}{8}$ miles in length. Should the western termination be assumed at Indian Cowpen, the length would be $103\frac{6}{8}$ miles, and the canal would then connect the tide in the Atlantic with the tide in the Gulf of Mexico.

From the foregoing description, we may conclude that, by means of a canal from the fork of Black creek to the mouth of the Sante Fé, the length of a water communication from the mouth of the St. John's to that of the Suwannee, would be $189\frac{4}{8}$ miles, viz:

From the mouth of the St. John's to that of Black creek,	47	miles.
From the mouth of Black creek to the Fork, - -	$12\frac{6}{8}$	miles.
From the Fork of Black creek to the mouth of the Sante Fé,	$74\frac{6}{8}$	miles.
From the mouth of the Sante Fé to that of the Suwannee, -	55	miles.
	$189\frac{4}{8}$	miles.

Out of this distance, the natural channels would afford a navigation of $114\frac{6}{8}$ miles.

Respecting a route of canal, if advisable, from the mouth of the St. John's to Indian Cowpen, its length would be 148 miles, viz:

From the mouth of St. John's to that of Black creek,	$31\frac{4}{8}$	miles.
From the mouth of Black creek to the Fork, - -	$12\frac{6}{8}$	miles.
From the Fork to the mouth of the Santa Fé, - -	$74\frac{6}{8}$	miles.
From the mouth of the Santa Fé to Indian Cowpen, -	29	miles.
	148	miles.

To which, adding 20 miles from Indian Cowpen to the mouth of the Suwannee, it will make 168 miles for the distance from the mouth of the St. Johns to the mouth of the Suwannee.

We shall close up this subdivision of our report, by describing some experimental lines of levels which were run, by instruction of the Board, with a view to obtain more fully all the data which might bear a relation to the object under consideration.

These lines are four in number: one from the Fork of Black creek to St. Mary's harbor, having for object to determine whether the St. John's route ought to debouch into this harbor, in preference to the mouth of the St. John's river; another from the mouth of the Santa Fé to the mouth of the Withlocoochy; this line, by following either bank of the Suwannee, connects the two routes under consideration; a third line has been run from Sampson's pond to the natural reservoirs of Pithlochucco lake, Alachua savanna and Orange lake, in order to ascertain their comparative elevations, as also the practicability of uniting them to supply the canal with water; in fine, a fourth line has been surveyed from Hillsborough bay to Ocklawaha river, with a view to determine the elevation of the ridge in that direction, and to test the practicability of a water communication from the upper part of St. John's river to the bay of Espiritu Santo.

Experimental Lines.

Map 1.—The line from the fork of Black creek to St. Mary's harbor terminates at Bell river, tributary to St. Mary's river; its length is $47\frac{6}{8}$ miles. The 16 first miles are through an elevated pine barren, the highest point of which is 95 feet above the Atlantic. This portion of line passes by the

heads of water courses emptying into Black creek, and therefore runs on the highest ground, the swamps, perhaps, did not permit to survey a line more to the east, which would have proved lower than that adopted.

From the 16th mile to the 35$\frac{4}{8}$th mile, the line passes through a less elevated pine barren, whose greatest elevation is 44 feet above the Atlantic.

The line then crosses the basin of Nassau river, and leaves it at the 39th mile. Hence, it continues to Bell river through the head of Loftin's creek: the greatest elevation of the ground between the swampy bottom of Nassau river and Bell river is 44 feet.

From the results afforded by the foregoing survey, it can be inferred that a route of canal, in this direction, would not be eligible, not only on account of the ground, but also of the scanty means afforded by the upper branches of Black creek and Nassau river, to supply 47 miles of canal. Therefore, a connexion between St. Mary's harbor and the St. John, is to be sought for along the direction of the inland passage, precedently described, (page 7,) and the route of canal, to effect this object, would have to be kept on the best ground, found through the low land between St. Mary's harbor and the St. John's.

Maps vi. vii.—The line from the mouth of Santa Fé river to that of the Withlocoochy, is 47$\frac{3}{8}$ miles long; it follows the eastern bank of the Suwannee. At its departing point, the ground is but twenty feet above the lowest tide in the Gulf, and at its terminating point, opposite the mouth of the Withlocoochy, the elevation above the Gulf is 80 feet. Between these two points, the ground, a pine barren, rises gradually towards the mouth of the latter stream; the whole fall is 60 feet. A route of canal either in this direction or closer to the stream, would meet with no difficulty on account of the ground, and might be easily fed from the Withlocoochy and the Suwannee. On the whole distance of 47$\frac{3}{8}$ miles, the Suwannee has no tributary of any consequence, on either bank; and from the great sameness of the pine barren, on both sides, in this quarter, it can be inferred that a line of levels run on the western side of the river, would have afforded similar results to those obtained on the opposite side.

Map xi.—With regard to the line of levels surveyed from Sampson's pond to the natural reservoirs of Pithlochucco lake, Alachua savanna, and Orange lake, it must be remarked that, previous to these surveys, the peninsula of Florida was altogether unexplored, in relation to the comparative elevation of its several parts; and that it became indispensable to leave nothing to the field of conjectures. Under this point of view, the three natural reservoirs, on the eastern side of the ridge presented themselves, with advantage, to feed the summit level of a canal, had their respective levels permitted of adapting them to such purpose. But, unfortunately, as it has been stated in a former subdivision of this report, (page 8,) the highest of these reservoirs has proved to be but 50 feet above the Atlantic; consequently 76$\frac{4}{10}$ feet below Sampson's pond, and 121 feet below Kinsley's pond. There can be no hope, therefore, of using these reservoirs to supply the summit section of a canal having to cross the Florida ridge.

The same facts prove also, that a water communication from the St. John's to the Suwannee, cannot be attempted through Orange creek, tributary of the St. John's, and outlet of those reservoirs just mentioned.

Orange lake, Alachua savanna, Pithlochucco lake, are connected together by outlets; the first is 7 feet below the second, and 9 feet below the third. The line of level surveyed from Pithlochucco lake to Sampson's pond,

crosses the military road and the head branch of the Santa Fé river; at the intersection of the road, the ground is 97 feet above Orange lake, and therefore 138 feet above the Atlantic; three miles further, the elevation is 149 feet; this point can be considered as the summit of the Florida ridge in that direction. At the point where the line crosses the Santa Fé, the ground is 85 feet above Orange lake, and 126 feet above the Atlantic; this elevation of 126 feet, it must be observed, is the same as that of Sampson's pond.

From the Santa Fé to Sampson's pond, the line of levels has been run in such a way as to avoid the swamps stretching in that direction, and has, therefore, met with elevated ground; but it is probable that a less elevated line might be procured.

The distance from Pithlochucco lake to the Santa Fé is 11 miles; that from the Santa Fé to Sampson's pond is six miles in a straight direction, and 8 miles in following the line of levels. Therefore, the distance from Pithlochucco lake to Sampson's pond, is from 17 to 19 miles. If to so great a distance is added the great elevation of the intervening ground between the reservoirs, now under consideration, and Sampson's pond, it will be readily admitted, that these reservoirs cannot even be used to supply the inferior levels of the western section of the canal. The same reservoirs might, perhaps, be resorted to for supplying an inferior level on the eastern section; but a feeder of at least 35 miles, through so sandy ground, would be a weighty objection as to expense and waste of water.

Map xxix.—Respecting the experimental line of levels from Hillsborough bay, on the Gulf, to Ocklawaha river, upper branch of the St. John's, it has been but cursorily surveyed; its object being merely to ascertain the elevation of the ridge in that direction, and to prepare information, which, on a future day, might be of some advantage, respecting the shortest communication between the upper St. John's and the Bay of Espiritu Santo.

The line, after leaving the head of Hillsborough bay, follows the military road as far as the old Indian town O-ke-hum-ky; hence it takes an easterly course to Ocklawaha river. It meets the swamps bordering this river at a point 50 feet above low water in the Gulf. On this whole distance of 80⅝ miles, it crosses, in succession, the main head branch of Hillsborough river, near the 21st mile, and at an elevation of 33 feet above the Gulf; the main head branch of the Amaxura, near the 45th mile, and at a point 37 feet above the Gulf. At the town of O-ke-hum-ky, where the line leaves the military road, the elevation above the Gulf is 62 feet.

The dividing point of the Florida ridge is near the 76th mile, about four miles west of the Ocklawaha swamp; its elevation above the Gulf has proved to be but 87 feet. However, on the western side of the ridge, the country between the 26th and 41st miles is higher than the top of the dividing ridge, near the 76th mile; on this distance of about 15 miles, the greatest elevation is 153 feet above the Gulf. This elevated ground presents no features of a ridge; but is rather formed of isolated hills, leaving between them ponds more or less extensive.

Hillsborough river has yielded, (in June,) 18 cubic feet of water per second, and the Amaxura 12 cubic feet, at their respective points of crossing.

The foregoing results show sufficiently that, though the top of the Florida ridge be very low in this direction, yet the want of water precludes the practicability of connecting, by a canal, the Ocklawaha, with either the Amaxura or Hillsborough river. We shall, therefore, dismiss the subject, and pass to the investigation of the St. Mary's and St. John's routes of canal.

INVESTIGATIONS OF THE SEVERAL ROUTES OF A CANAL ACROSS THE PENINSULA OF FLORIDA.

General Map.—From the foregoing description of surveys, it can be inferred, that the routes through St. Mary's river, and through Black creek, are the only ones for a canal destined to connect the Atlantic with the Gulf of Mexico.

Respecting the St. Mary's route, it has been shown that on account of the great elevation of the intervening ground between Bell river and St. Mary's river, at the crossing point, and also, between this point and the mouth of Alligator creek, it would most likely become indispensable to follow the very circuitous course of the river, a circumstance which would increase the distance by about thirty-six miles: indeed, the survey shows a distance of forty-two miles, from Bell river to the mouth of Alligator creek, whilst the computed distance, measured along the bank of St. Mary's river, amounts to about seventy-eight miles.

Again, it has been stated that the Okefenoke swamp, stretching on the top of the dividing ridge, did not afford any natural reservoir of consequence; and that forty-five and a half miles of canal would have to depend, entirely, on water collected in artificial reservoirs. On this score, the nature and great extent of this swamp, give reasonable hopes that by a proper system of drains, the standing water in the marshes would be made available, by collecting it in sufficient quantity to supply the summit and middle sections of this canal; but the expense would be great, though partially compensated by the increased value of the land thus reclaimed.

From the Suwannee to St. Mark, the canal would be sufficiently provided with water, from the Suwannee and the Ausilla; but, as it has been stated before, this route would have to wind around, south of the surveyed line, the spur on which stands the district of Tallahassee.

The distance from Bell river to St. Mark, in following the surveyed line, is 183⅜ miles; but, in keeping along the bank of St. Mary's river, the route of canal, from the junction of Bell river up to the mouth of Alligator creek, would be about 36 miles longer, or 219 miles.

However, were it in contemplation to connect the Gulf with the St. Mary's river, at the head of tide, the Eastern termination of the canal would be in the vicinity of Barbour's plantation; and, should it prove practicable, and within reasonable expense, to descend from Okefenoke swamp into St. Mary's river, in following a direct course, the distance to St. Mark would be 155 miles. But, should it be found indispensable to follow the river, in order to descend from Okefenoke swamp to tide-water, the distance to St. Mark would be 192 miles.

In either case, the elevation of the summit level will remain the same: 152 feet above low tide in the Atlantic, and 148 feet above low tide in the Gulf; the whole amount of ascent and descent will be 296 feet, measured from a level 4 feet above low water in the Atlantic to the level of low tide in the Gulf; or rather 256 feet, by supposing the summit level sunk 20 feet below the summit ground.

Before entering into particulars, relating to the route of canal through the head waters of Black creek and Santa Fé river, it is necessary to determine where should be assumed the Eastern and Western terminations of the canal. Respecting the Eastern, it would seem that the mouth of St. John's should be selected as the most eligible; but such a debouch would not be with-

without inconveniency. 1st. Small boats cannot, without great danger, stem the current of St. John's river, above its mouth; and sea-vessels require strong and very favorable wind to cross over the shifting bar, and to make head against the bold current of either ebb or flood tide. These circumstances render the entrance of the St. John's not accessible in adverse weather, dangerous when the wind does not assist sufficiently against the current, and precarious on account of the necessary concurrence, or rather relation, which must take place between the wind and the current, to facilitate the sailing in or out of the river. 2dly. Such difficulty of access would, in time of war, prove very injurious on a coast, which, south of the St. John's, presents no shelter of any consequence: the safest for vessels bound to the canal, would be to make first the harbor of St. Mary's, and there to wait for propitious weather. 3dly. It has been stated, in describing the surveys executed in relation to the St. John's route, that a canal from a point opposite the mouth of Black creek to the mouth of Pablo creek, would require, above low tide, an excavation averaging 28 feet in depth, or 26½ miles in length: this section of canal would save a distance of about 16 miles, when compared to the natural channel of the river; this advantage cannot balance the expense for the construction of this portion of canal. Indeed, in keeping this line of canal nearer to the bank of the St. John's, the excavation would prove not so great, but the distance, then, would not become materially lessened. 4thly. It has also been shown, that a section of canal, from the fork of Black creek to the mouth of this tributary of the St. John's, would involve into an extraordinary excavation, and be deprived of a sufficiency of water; besides, when compared to the natural channel of Black creek, it would not shorten the distance more than by 4 or 5 miles. 5thly. A canal from the fork of Black creek to the mouth of the St. John's, following the banks or margins of both rivers, would not procure considerable advantages over the natural channels, which enjoy the benefit of tides, nor could it remove the difficulty of ingress from, or egress to the sea. A vessel having made into the St. John's, can then ascend as far up as the fork of Black creek, head of tide navigation; for, the depth of water over the bar, at the mouth of Black creek, is 6½ feet at low tide, and 8 feet at high tide: the latter being little more than the depth over the St. John's bar, at medium low tide. Therefore, should the mouth of the St. John's be assumed as the debouch into the Atlantic, of the water communication across the peninsula, a canal from this point to the fork of Black creek would afford no sufficient advantage to warrant its expense of construction. 6thly. If taken into consideration, that the inconsiderable depth of water, over the St. John's bar, as also the insufficiency of water on the summit level, preclude the idea of a ship channel, the trans-shipping of cargo from sea-vessels to boats, or from boats to sea-vessels, will remain the same, whether the canal terminates at the mouth of the St. John's or at the fork of Black creek. Therefore, whilst conveniency does not strictly necessitate the extension of the canal to the mouth of the St. John's, considerations of economy lead the Board to recommend the fork of Black creek, head of tide navigation, as the Eastern termination of the canal.

Now, it remains to determine, whether the debouch of this communication into the sea, must be at the mouth of St. Mary's harbor or of the St. John's. To the local inconveniences just enumerated, in regard to the latter, are to be added those relative to the inland navigation along the coast. Indeed, the lower part of the St. John's is connected with St. Mary's harbor,

but, by the natural crooked channel, called Inland Passage, which admits the transit of row boats only; and, in the present state of things, the natural inland water communication, parallel to the coast, can be considered as terminating at St. Mary's. This commodious harbor, presenting on the bar a depth of 13½ feet at low water, and 19½ feet at common high tide, is susceptible of defence, and derives a great importance from the circumstance of being the only good harbor from the boundaries of Georgia to Cape Florida.

From this, it can be inferred, that the mouth of the St. John's is not virtually connected with an inland water communication parallel to the coast, whilst St. Mary's harbor is an interesting station, at which terminates the natural inland navigation, from the Chesapeake to Florida: navigation which could be extended to the head of St. John's river, by opening a canal in the direction of the inland passage from St. Mary's to the St. John's. This canal would procure to the water communication across the peninsula, the most eligible debouch into the Atlantic; and would, besides, form the southern link of our inland water communication parallel to the coast, in the same manner as the Dismal Swamp Canal forms the northern link of the same navigable line. Here it must be remarked, that the St. John's, in descending from the south, effects a parallel direction to the coast, and that, south of its head branches, the Territory of Florida will, most likely, not soon be settled, on account of the sandy and swampy nature of the soil. Therefore, the upper parts of the St. John's may be considered as being the southern extremity of the line of natural water communication, parallel to the coast: at least, there appears, at the present time, no plausible motive to have it extended further south.

These considerations induce the Board to recommend St. Mary's harbor as the debouch into the Atlantic of the contemplated communication, and to this effect, to open a canal for sloops from St. Mary's harbor to the St. John's.

Let us pass, now, to the investigation relative to the Western termination of the canal.

It has been shown, in the description of the surveys executed on the St. John's route, that the canal would debouch into the Suwannee, at or in the vicinity of the mouth of Santa Fé river. From this point, the canal has either to descend to the Gulf in following the Suwannee, or to take a direction to St. Mark: in the first case, the distance to the Gulf would be 55 miles; in the second, about 95 miles, (from computation.) Thus, shortness of distance, and unobstructed navigation in the Suwannee, seem, at first, to be in favor of the former course, and more especially, when it is taken into view, that a canal for boats might end at the mouth of the Santa Fé, where might commence a commodious steam-boat navigation. But, most unfortunately, the access from the sea to the mouth of the Suwannee is much obstructed by oyster-banks, and the approach to the shore impeded by the extensive shoal making along the coast from Espiritu Santo to St. Mark: sail vessels drawing more than 5 feet cannot, at high tide, hazard to steer for the mouth of the Suwannee; and even this draft would be too great during the prevalence of northerly winds. To this must be added, that from the Bay of Espiritu Santo to St. Mark, the coast presents no shelter where vessels could lie at anchor, and wait for propitious weather.

From these considerations, it can be concluded, that by using the Suwannee as a navigable stream, a steam-boat navigation might be established

down to the mouth of this river; but hence to St. Mark, Pensacola, and New Orleans, the passage by sea would become very precarious on account of the circumstances just enumerated. Therefore, to obtain a permanent communication and a more commodious debouch into the Gulf, the only alternative is, to terminate the canal into the harbor of St. Mark. It will be remembered, that St. Mark river affords, at its mouth, 8 feet of water at high tide, and that a good anchorage is found inside of the outer bar for vessels drawing 10 feet. To this must be added, 1st, that the coast east of St. Mark is not provided with any inland natural channel parallel to it, whilst to the west of St. Mark, the great depth of water along the shore, and various intervening sounds, will facilitate, if not a complete inland navigation, at least a pretty safe one along the coast—many good anchorages being found from St. Mark to Pensacola: 2d, that the vicinity of St. Joseph's bay will secure to the anchorage of St. Mark, the efficient protection of our armed vessels: 3d, in fine, that the debouch of the canal being near to the thriving settlement of Tallahassee, will, in time of war, become supported by a population more compact than probably would be afforded by any other district of Florida; and that it will also ensure, at all times, the communication of this district with the Atlantic States.

The Western termination of the canal being thus determined, it remains to devise, as to the route of the section of canal which would connect the Santa Fé with the harbor of St. Mark. The Board entertain no doubt as to its practicability; and, had the line from the mouth of the Withlocoochy to St. Mark, been run in conformity with the instructions, as a line of canal instead of a line of levels, the survey executed in that quarter would have afforded positive data upon which would rest the practicability of a canal from the Santa Fé to St. Mark. However, the surveys performed along the Santa Fé river and the Suwannee, procure individual facts which will assist the Board in pointing out the section of canal route under consideration.

Maps III. IV.—The bank of the Santa Fé, near the place (Natural Bridge,) where the river sinks under ground, is 68 feet above the Gulf—6 miles above this place, the rise caused by freshets is represented to be $14\frac{22}{100}$ feet above the common stage of water—the quantity of water yielded by the river at Rocky Ford, 14 miles above the natural bridge, has been found to be 176 6-10 cubic feet per second: the river was then 11 2-10 feet below high water mark. From these facts, it can be concluded, that by damming the Santa Fé at a favorable place above the natural bridge, the whole water of the river will, at common stage, become available, and yield at least 176 6-10 cubic feet per second, besides the resources of a reservoir which will extend several miles towards Rocky Ford; this supply will be more than necessary to feed 50 miles of canal through sandy ground.

Map VII.—The Suwannee at Charles Ferry, where it is crossed by the military road from St. Augustine to Tallahassee, has its bank 52 feet above the Gulf, and, therefore, 16 feet below the bank of the Santa Fé, near the upper end of the natural bridge. This shows that there is a fall between these two points; and though the surveys do not exhibit, precisely, the respective elevation of the streams at Charles Ferry and at the natural bridge, yet this fall remains well ascertained; whence results the practicability of a canal from the latter point to the other The distance will be about 50 miles, the ground easy, and the supply of water sufficient.

Map xxvii.—The Ausilla, where crossed by the St. Mary's line of levels, is 47 feet, and its eastern bank 73 feet above the Gulf. Therefore, by assuming, on this river and below the latter point, a convenient termination with regard to the Suwannee, in the vicinity of Charles Ferry, the two streams will easily be connected by a canal descending to the Ausilla, and well supplied from the Suwannee. The distance will be about 45 miles.

From the Ausilla to St. Mark, the distance will be about 20 miles; and in this direction, a canal will receive from the Ausilla a large supply of water, amounting, as stated before, to 217 8-10 cubic feet per second.

Such is the route which the Board recommend to connect the Santa Fé with the harbor of St. Mark. The whole distance will be about 115 miles; the descent to low tide in the Gulf, (low tide which is supposed to be about 4 feet above low tide in the Atlantic,) is assumed 62 feet from Rocky Ford; the supply of water will be largely furnished by the Santa Fé, the Suwannee, and the Ausilla. With regard to the ground, it will not necessitate much extra excavation—the digging will generally be easy; however, on many portions of great extent, it will be necessary to carry the line of canal through marshes and cypress swamps. A great waste of water is to be expected from filtration through the sandy upper stratum, laying on a substratum of porous and rotten limestone, and also from evaporation; but the means of supply are very great; and during heavy showers, so frequent under the climate of Florida, the trunk of the canal will receive, from filtration of the ground, very copious additional supply.

It remains now to investigate the section of canal, which would be the continuation of the preceding one to the fork of Black creek, that is to say, to the head of tide water on the Atlantic.

This section comprehends the summit level, and has to rely, for supply, mainly on the natural reservoirs of Sampson's and Kinsley's ponds; the former 126 4 10 feet, the other 171 feet above low tide in the Atlantic: about 4 feet less above low tide in the Gulf.

Kinsley's pond, on the eastern side of the ridge, might be assumed as the summit of the canal, were its supply of water sufficient; but this supply is far from being adequate to the object. Indeed, this reservoir would have to provide for about 14 miles of canal, (shortest distance between Sampson's pond and a point 6 miles above the fork of Black creek, where a reservoir might be obtained in the valley of Bull creek,) and for lockage at the summit. The canal being supposed to be 33 feet at the bottom, and to have a depth of water of 5 feet, it will require per month and per mile 120,000 cubic yards—absorption, filtration, and evaporation being taken into account: the 14 miles will, therefore, require for nine months 15,120,000 cubic yards. Owing to the nature of the climate, the navigation must be open throughout the year; but, in this calculation, nine months only are assumed, because it is expected that, during three months of heavy rain, the freshets in the head branches of Black creek and Santa Fé river will supply these 14 miles of canal.

Assuming the passage of boats per day to be 45 each day, or 90 both ways, the number throughout the year will be 32,850, which, at the rate of one and a half lock full, or 623 cubic yards per each boat, will require 20,465,550 cubic yards of water per annum. The lock is here supposed to be 100 feet long, 14 feet wide in the clear, and 8 feet lift.

Adding together the two items of expense of water, it will be found that 35,585,550 cubic yards of water are necessary to supply, during the whole year, the prism of the canal and the lockage at the summit.

The superficies of Kinsley's pond, is 7,714,000 square yards; the depth has not been ascertained, but is represented to be about 6 feet. This reservoir cannot, therefore, be deemed to contain more than 15,428,000 cubic yards of water: a quantity which, if available, would not be half of what is necessary. But such supply cannot be drawn from the pond, the localities presenting no probable means to have this pond replenished as fast as partially drained: indeed, the country sloping around it is of small extent in superficies, and its outlet, dry in summer, is not considered as yielding more than 10 cubic feet of water per second, during the rainy season. This pond seems, therefore, to be fed mainly from filtration, inasmuch as it receives no water course, and, as it is well known, the loss of a reservoir throughout the year by evaporation, is greater than the rain falling on its surface. During the rainy season, the rise of the pond is represented as being sometimes 2 feet, and in damming the outlet, this elevation can be considered as the maximum depth of available water: this would produce a supply of 5,142,466 cubic yards of water.

This result shows that Kinsley's pond alone is inadequate to procure the whole water required; therefore, the summit level must be kept lower, and tried at the elevation of the reservoir, immediately below, and which lies on the western side of the ridge.

This reservoir is Sampson's pond, 45 4-10 feet below Kinsley's pond: its superficies is 16,362,777 cubic yards, and its rise, during the rainy season, has been ascertained to be 3 feet. Therefore, the minimum supply to be drawn from this pond, can safely be estimated at 16,362,777 cubic yards, more especially should the outlet to this reservoir be dammed This supply, added to that of Kinsley's pond, will give 21,505,443 cubic yards for the quantity of available water drawn from both ponds: a quantity sufficient to supply the lockage.

By keeping thus the summit level at a less elevation, a deep cut will become indispensable through the top of the dividing ridge; but, taking into consideration that the streams of Florida, in this quarter, receive few tributaries, and are chiefly fed by filtration, the Board anticipate that this deep cut will procure the advantage of feeding, by means of filtration, the prism of the portion of canal forming the summit: a prism which would thus become an artificial reservoir.

Maps III. XI .—This deep cut, in following a direct course from Kinsley's pond to Sampson's pond, would require, under the very top of the ridge, a depth of 122 1-10 feet, by assuming the bottom 10 feet below the medium level of Sampson's pond, or 116 4-10 feet above the Atlantic. But the line of levels, from Orange lake to Sampson's pond, shows that the top of the ridge, east of Little Santa Fé pond, or the 25th mile from Orange lake, is but 158 feet above the Atlantic; whilst, in the direction of Kinsley's pond and Sampson's pond, the elevation is as much as 237 5-10 feet; therefore, at this place, the top is 79 5-10 feet higher than it is in the vicinity of Little Santa Fé pond. This circumstance indicates that the ridge becomes depressed between the outlet of Kinsley's pond and the southern head-branch of Santa Fé river; the summit level must consequently take this course, in order to lessen, as much as practicable, the depth of the cut through the ridge. Thus, the cut will commence in the valley of Bull creek, at a point 116 4-10 feet above the Atlantic, 54 6-10 feet below the surface of Kinsley's pond, and 41 6-10 feet below the summit of the ridge, in the vicinity of

Little Santa Fé pond; hence it will take its course towards this pond, to terminate into Santa Fé river, at a point 10 feet below the medium level of Sampson's pond, or 116 4-10 feet above the Atlantic. By following the depression of the ridge, the greatest depth of the cut will not probably exceed 60 feet, and the length of the summit level will be about 25 miles. The eastern end in Bull creek will be 3 miles east of Kinsley's pond, and 9 miles from the fork of Black creek; the western end, in Santa Fé river, will be about 5 miles above Rocky Ford, and five miles from Sampson's pond.

From these premises it is seen that, by assuming the summit level 116 4-10 feet above the Atlantic, the two ponds will furnish the necessary water for lockage; but, with respect to the prism of the level, about 25 miles in length, it has to rely entirely on the resources derived from filtration through the ground; *therefore, the practicability of the canal rests altogether on this point.*

The following observations, made by the Board during their examination of the peninsula of Florida, lead them to anticipate a favorable result:

1st. The sandy upper stratum, and the rotten limestone substratum will facilitate the filtration to a high degree.

2d. The ponds on the summit of the ridge are chiefly kept full by filtration.

3d. The numberless ponds, of various sizes, scattered every where on the surface of the peninsula, form a strong indication of the facility afforded by the ground for the transmision, through it, of water to inferior levels.

4th. The main streams of the peninsula have few tributaries; they are, however, flush during the warm season, and suddenly swelled by accidental heavy showers: this shows that they must chiefly receive their supply from filtration.

Should, however, the foregoing facts be deemed not sufficient to ensure the result, though anticipated, yet not positively warranted by the Board, the practicability of the canal would then remain altogether questionable, till the sinking of shafts to the depth of the cut should have tested the degree of reliance to be placed on the foregoing conjectures.

From the eastern end of the summit level to the fork of Black creek, the distance will be about 9 miles, and the fall 112 4-10 feet, to a level 4 feet above low tide in the Atlantic. This portion of canal will be fed by a reservoir in the valley of Bull creek, by the south prong of Black creek, and by the water previously used for lockage at the summit.

From the western end of the summit level to the natural bridge, the length of canal will be about 19 miles, and fall 50 4-10 feet, assumed down to Rocky Ford. The Santa Fé, the north fork of Santa Fé, and the water previously used for lockage at the summit, will supply this portion of canal.

The whole length, and the ascent and descent of the route of canal from the fork of Black creek to the harbor of St. Mark, will be as follows:

	Miles.	*Feet.*
From the fork of Black creek to the eastern end of the summit level, distance, - - - - -	9	
Ascent from 4 feet above low tide, - - -		112.4
Summit level, length about - - - -	25	
From the western end of the summit level, to the Natural Bridge, distance, - - - - -	19	
Descent, - - - - - - -		50.4

From the Natural Bridge to St. Mark, at low tide in the	*Miles.*	*Feet.*
Gulf, distance, - - - - - -	115	
Descent, - - - - - - -		62
Whole distance, and ascent and descent, - -	168	$224\frac{8}{10}$

Let us compare now this route with that of St. Mary's. The distance by the latter, from the head of tide in St. Mary's river, to low tide in the harbor of St. Mark, will be 192 miles, in following the bank of the river; and the whole amount of ascent and descent 256 feet; therefore, respecting distance and expense of lockage, the St John's route has the advantage.

Both routes will require expensive excavations to supply the summit level with water. But, on the St. John's route, the item of lockage is secured, and the prism of canal, which is to be supplied by filtration, is only 25 miles long; whilst on the St Mary's route, draining and filtration must procure the water required, both for lockage and for 45 miles of canal. In such a state of things, the Board consider the chances of greater expense and of insufficiency of water as against the St. Mary's route; and, therefore, recommend the St. John's route.

This route has, besides, the advantage of being susceptible of affording an early and partial result, by terminating either in the Suwannee or the Santa Fé; where, a point being assumed as the head of steam-boat navigation, a water communication through the canal and the Suwannee would become established between the Atlantic and the Gulf.

With regard to a sloop-canal, connecting the habor of St. Mary's with the St. John's river, its main object is independent of a canal across the peninsula: should the St. Mary's route be preferred, its importance would remain the same, but it would increase should the St. John's route be adopted.

Respecting the cost of the work, the Board are not now prepared to undertake this part of their task. The appropriation made by Congress has been entirely expended in making the surveys herein described; all which were strictly indispensable to ascertain, (in a country, to this time, but superficially known in relation to its topography and hydrography,) the facts, and procure the data upon which the selection and practicability of a route should be predicated. It remains now to fix the canal on the ground, to plan the work and all its details, and thence to devise the elements upon which must rest the estimate. Minute surveys will, consequently, become necessary to enable the Board to frame the estimates required by the resolution of Congress. The Board, therefore, shall here close up this subdivision of their report, and pass to that which relates to the navigation along the western coast of Florida.

Inland Navigation along the Coast from Tampa Bay to the head of the Delta of the Mississippi.

General Map.—In describing the coast of Florida, it has been shown, that not only there exist no natural inland channel parallel to it from the bay of Tampa to St. Mark, but that, also, the navigation along the sea shore is impeded by oyster banks, which, at high tide, admit no craft drawing more than five feet. Besides, the wide shoal extending along this section of coast, renders the latter altogether deprived of any anchorage. Therefore,

it is but from St. Mark, or rather from Ocklockony bay, that a navigation along the coast, suited both to the state of peace and to that of war, can be expected.

From St. Mark to the mouth of Ocklockony river, and hence to the mouth of Crooked river, 7 feet can be carried (page 15) at low tide. This can dispense with opening a canal (page 29) destined to connect St. Mark river with Sockochoppe creek, at the head of Ocklockony bay: inasmuch as a canal, in this direction, would be very expensive, should even the line be carried with a view to avoid the high ground through which the survey has been made, and to pass through the swamps stretching parallel to the coast.

From the mouth of Crooked creek to New river, the creek though (page 29) affording, at low water, 5 feet, yet is too winding to be used as a convenient channel; but a canal, about 15 miles long, would connect, in this direction, Ocklockony river with St. George's sound. The termination into this sound would have to be fixed at a convenient point, east or west of the mouth of New river.

The distance between this river and East Point, in the bay of Appalachicola, is about 16 miles, (page 29) the line surveyed, in that direction, passes through a much elevated ground, and would not be adapted as a route of canal; it is, therefore, more advisable to use the sound itself to reach from New river the bay of Appalachicola. The sound is represented as being navigable, at low water, for crafts not drawing more than 6 feet; but, as the obstructions which limit this draft are chiefly oyster banks, there is every reason to admit that they might be partially removed. Therefore, by means of a canal, about 15 miles long, from the mouth of Crooked creek to St. George's sound, in the vicinity of the mouth of New river, a convenient navigation can be opened from St. Mark to the mouth of Appalachicola river, for crafts and steam-boats drawing from 6 to 7 feet navigation, which would ensure to the trade of the valley of this river the benefit of the communication destined to connect the Gulf with the Atlantic.

From Appalachicola bay to St. Joseph's bay, no communication can be obtained through the western end of St. George's sound. The Indian pass (page 15) is shallow, and affords an inconsiderable depth: therefore, crafts bound for the westward from the Appalachicola, will be obliged to take the main pass of St. George's sound, and to sail along the coast. The latter, as far as Pensacola, is bold, and offers, on this distance, many safe anchorages, viz: St. Joseph's bay, St. Andrew's sound, and the Eastern entrance of St. Rosa sound, when the southerly winds are moderated.

With regard to an inland channel from Appalachicola bay to Pensacola, a connexion between Appalachicola and St. Joseph's bays, might, perhaps, be effected through lake Wimico, and a cut from this lake to the latter bay; but no survey having been authorized in this direction, the practicability of such a communication has not been ascertained. The same remark can be applied to the western end of St. Andrew's sound, to the bay of same name, and to that of St. Rosa; which bays being united by a cut, 5 or 6 miles long, would connect, by an inland water communication, the bay St. Joseph with St. Rosa sound. Both bays of St. Andrew's and St. Rosa should be sounded; should they prove to have but an average depth of 4 or 5 feet, (as it has been represented) they could not be deemed of great assistance in relation to an inland navigation parallel to the coast.

Respecting St. Rosa sound, the length of which is 45 miles, it has been shown (page 17) that, inside of its eastern entrance, it does not afford, at low

water, more than 3½ feet, at the place where the tides meet; but by improving this part of the sound, this interesting channel would admit, at high tide, the passage of crafts drawing 6 feet.

If we take into consideration the practicability of connecting the bay of Ocklockony with that of Appalachicola, the safe anchorages offered on the coast, from the latter bay to the eastern entrance of St. Rosa sound, the possibility of improving this entrance, the protection by armed vessels, which Pensacola and St. Joseph's bay will lend, it can be concluded that the coasting navigation from St. Mark to Pensacola can be rendered sufficiently secure and convenient for small sailing vessels.

Let us now examine this coasting navigation, westward to the head of lake Pontchartrain.

The description of the communication between the bay of Mobile and lake Pontchartrain, given in a former sub division of this report, (page 19 and following) shows that, by improving the shallow pass au Heron to the depth of 8 or 9 feet, the sound along that part of the coast, will afford, at medium tide, a safe and convenient navigation between the bay and the lake, to sea vessels not drawing more than 8 feet. Whilst these vessels can sail up the bay to the city of Mobile, and navigate lake Pontchartrain, they will find a passage to the Mississippi through the sloop canal contemplated in the vicinity of New Orleans. Therefore, this city and that of Mobile, or more emphatically, the rich valleys of Alabama and of the noble Mississippi, will become connected by a commodious and well protected communication, the length of which can be estimated at 160 miles. A canal 5 miles long, at or near New Orleans, and the improvement of the pass au Heron will effect this important result.

But another no less interesting object, would be the connexion of the bay of Mobile with that of Pensacola. Indeed, as to support, relief, and supply in time of war, it is highly desirable that the latter bay, the only naval place of arms on the Gulf, should have a safe and commodious communication with Mobile, New Orleans, and the head of lake Pontchartrain. Besides, such a communication might be deemed of great advantage to commerce, considering that Pensacola, on account of a greater depth of water than any of our harbors on the Gulf, will, perhaps, become, in the course of time, the port of exportation for the State of Alabama, and that of importation of the East India produce destined to the States in communication with the Gulf.

Under these impressions, the Board, when in Florida, have examined the country west of Mobile bay, with a view to ascertain the main facts upon which might be anticipated a connexion of the two bays by means of a sloop canal. The information derived from their excursion, led them to hope that a water communication might be opened from the bay Bon Secour (in Mobile bay) to the Great Lagoon, at the entrance of Pensacola bay. The distance would be less than 30 miles.

Indeed the country in this direction is very low, and several intervening natural channels would become of great assistance.

The bay Bon-Secour, within four miles from the mouth of the river Bon-Secour, affords a depth of 9 feet; this depth lessens gradually in approaching the river, and on the bar, at the entrance of the latter, it is but 3 feet at low tide, and 5½ feet at high tide. The river is navigable for 10½ miles up, but is winding on the first seven miles, and very narrow and crooked on the remainder, that is to say, 3 miles above Lacoste's plantation. By improving

the mouth of the river, at two or three places, this plantation might be assumed as the commencement of the canal. Hence, following the bed of the river for about half a mile, then its tributary, Bayou Johnson, for about one quarter of a mile, a cut of 4 miles would connect the latter Bayou with Bayou Portage: the ground is low and level. The route would then descend, for 2 miles, Bayou Portage, whose depth is represented to be 8 feet; hence, through the bay Laland, which, on a distance of 10 miles, affords from 5 to 6 feet depth, the crossing of the Perdido river would be about 2 miles in width; its depth is 10 feet. The cut to connect this river with Great Lagoon would not be more than 1 or 2 miles through a level and low ground. From the end of this cut, at the head of Great Lagoon, to the entrance into the bay of Pensacola, the distance is said to be 9 miles; the depth 3 feet at the shallowest places, and 6 feet at the deepest.

Those local informations, which accurate surveys alone might appropriate to the location of a line of communication, show, at least, that there is no insuperable difficulty to effect the connexion of the two bays; and it is to be added, that the termination of this navigable line into either bay, will be rendered perfectly secure by means of the defensive works destined to defend the entrances of these bays.

Such are the main features of the navigation along the coast from the bay of Espiritu Santo to the head of lake Pontchartrain, and the improvements which seem to the Board feasible and expedient.

We shall now submit some views in relation to the Delta of the Mississippi.

Improvements through the Delta of the Mississippi.

There is no State in the Union for which nature has done more than for Louisiana, in relation to water communication: traversed by the Mississippi and Red rivers, provided with numerous and deep water courses, well supplied at any season of the year; in fine, having a soil formed of fluviatic deposites through which water is met with at the depth of a few feet; the State of Louisiana enjoys, to a high degree, all the requisites for a system of inland navigation.

A system of canals, in Louisiana, is not, however, to be limited to the object only of connecting all points with one another, and with the main arteries of exportation and importation; it must, besides, like at the mouths of the Nile, of the Rhine, the Meuse, and the Scheld, be framed to guard the country against the havoc of inundation; to reclaim the tracts of land, which, by their elevation, are susceptible of being drained into lower ground; and also to facilitate, by proper artificial means, the deposite of the rich water sediment on the marshy ground, and thus to create, in process of time, fertile and valuable land.

Such a system, framed with a view to connect together and fulfil all these important requisites, would not only be beneficial to the State of Louisiana, but would also add greatly to the value and quantity of public land in this quarter. Besides, nature having set geographical limits to the growing of certain products, the sugar land of Louisiana, by increasing in extent, would render our population still less dependent on foreign markets for an important article of general consumption.

Time, surveys executed by competent men, and close investigation, would become necessary to plan a system of canals and works which would have

to fulfil so many requisites; therefore, were the Board allowed to expatiate, in the present report, on this subject, they are not now prepared to submit any positive idea in relation to it. However, having been directed to examine the outlets of Manchac, Plaquemine, and La Fourche, with a view to their improvement, they may be permitted to introduce herein, the information they have obtained respecting these outlets, to the effect of using them either as navigable channels, or to assist in the discharge of the Mississippi.

The Bayou Manchac, or Iberville river, has formerly connected, in time of freshets, Lake Pontchartrain with the Mississippi: it leaves the latter at about 15 miles below Baton Rouge, and discharges itself into Lake Maurepas, out of which there is a natural channel leading to Lake Pontchartrain. During the last war, the Bayou had been obstructed at its end on the Mississippi; and, afterwards, solicitations were made to have it again opened. However, having become partially cleared, the plantations along its banks, as also the rear of those fronting on the Mississippi, were subject to be overflown in time of freshets; and at the request of the inhabitants of the neighborhood, the Bayou has been, in 1826, entirely and substantially shut up at its head on the Mississippi. Indeed, unless dikes should be erected on each bank of the bayou, with sluices to drain, during the warm season, the low ground, the opening of this channel would become much obnoxious to the plantations in its vicinity.

From the Mississippi to Lake Maurepas, the distance, through the meanderings of the Bayou, is, at the least, 55 miles; and from the entrance into Lake Maurepas to the head of Lake Pontchartrain, the distance can be reckoned at 16 miles. At the junction of the Bayou with the Mississippi, this river rises about 28 feet above the lowest stage, and the bottom of the Bayou is about 13 feet above low water mark in the Mississippi. Therefore, as an outlet of discharge, the Bayou might give passage to a column of water 15 feet high; and as a navigable canal, boats could pass through it but during high stage of water in the Mississippi.

To use Bayou Manchac as an outlet of discharge, it would become necessary to confine a portion of its channel within dikes sufficiently raised to guard the neighboring land against inundation; and to procure a still water navigation, at any stage of water in the Mississippi, it would be indispensable to lower its bottom, at its junction, by more than 13 feet, to erect a guard lock at the opening and other various works along the communication. However, by restricting the work to be executed to the erection of dikes, and the deepening of the bottom, the Bayou would then afford a descending water navigation into Lake Pontchartrain, and besides assist the Mississippi in the discharge of its water. The head of the current would increase with the rise of the Mississippi; and, if taken into computation that the highest rise at New Orleans is 15 feet above the lowest stage in the river, and 15½ feet above low water mark in Lake Pontchartrain, whilst the highest rise at Bayou Manchac is about 28 feet above low water in the Mississippi, it can be concluded that the greatest fall from the upper end of the Bayou to Lake Pontchartrain cannot be less than 28 feet.

Such a communication would, no doubt, become interesting to the trade of Comite and Amite rivers, by providing a channel through which these rivers would be connected with the Mississippi and New Orleans; but a canal uniting the Mississippi and Lake Pontchartrain, at, or in the vicinity of

New Orleans, would procure almost similar advantages to this trade, which is, in the present state of things, in communication with Lake Pontchartrain through Iberville river and Lake Maurepas. With respect to a general thoroughfare, it is to be remarked that, at medium tide, vessels drawing more than 6 feet cannot, through the outlet of Lake Maurepas, enter Lake Pontchartrain; therefore, a navigation directed to the sea by Bayou Manchac would be less convenient than either through the Mississippi, down to its mouth, or through, in succession, the Mississippi, the canal contemplated at New Orleans, and the Pass Rigolettes, which admits, at medium tide, vessels drawing 8 feet.

But if, to the advantage of a thoroughfare, is added that of assisting the Mississippi in the discharge of its water, at the time of freshets, it can be concluded that the improvements which would make Bayou Manchac fulfil these two objects, would, as to commerce and security against inundation, highly deserve the national cares.

Indeed, the freshets in the Mississipp iare observed to become higher than formerly, the ruptures of the dikes more frequent, hence the settled parts of lower Louisiana more and more menaced of being overflown. Before the extension of settlements along the margin of the river, numerous issues and outlets were carrying to the sea a considerable volume of water, but the security of the establishments fronting the river has necessitated the erection of *levees* or dikes, which, by shutting up these outlets, and also straightening the bed of the Mississippi, have confined within a narrower channel, the enormous mass of water which has to flow through it. This mass must, consequently, rise higher than formerly: and, as the progress of cultivation will more and more counteract the expansion of the river, it follows that lower Louisiana has much to apprehend, in the course of time, from such unavoidable effect. Therefore, without entering into details too foreign to this report, it can be inferred from this short view that any improvement which could facilitate, in lower Louisiana, the discharge of the Mississippi, would avert impending calamities, and confer benefits on the States bordering upon the Mississippi.

With a view to the same objects, the Board have been directed to examine the Bayou Plaquemine. This Bayou makes out of the Mississippi on the western side, and connects this river with Bayou Teche through the Atchafalaya. The Mississippi at its junction with Bayou Plaquemine, nearly opposite to Bayou Manchac, rises about 28 feet in high freshets; the bottom of the Bayou is 22½ feet below high water mark, and 5½ feet above low stage in the river. The width is about 150 yards, but soon becomes, on an average, 60 yards, which width it retains down to its embranchment with Bayou Jacob.

Bayou Plaquemine is navigable when the Mississippi has attained its medium rise; and, at high water, the current becomes very rapid, owing to the short distance between the head and the foot of the fall. The entrance of this channel into the Mississippi, being at a re-entering bend of the river, is liable to be obstructed by drift wood from the Mississippi. Therefore, this channel of navigation and of discharge, is menaced of being shut up, to the great injury of lower Louisiana. To guard against so serious an accident, as also to render commodious, through the outlet of Plaquemine, a water communication between the Mississippi and Bayou Teche, would require a steady observation of the facts connected with both objects; facts which would be obtained but by a long stay on the spot, and a close study of the river through its various stages.

With regard to La Fourche river, (about thirty-six miles lower down,) which might also be used as a channel of navigation and discharge, it would require much improvement to be fitted to that double purpose. The bottom of this river, at its junction with the Mississippi, is about on a level with the low medium stage in the latter; and during the rise of the Mississippi, the river La Fourche affords a pretty convenient navigation to barges. However, at about the middle of its course, its bed is fast filling up: on a distance of about sixteen miles, the width and depth have already diminished by about one-third of what they formerly were. This obstruction is extending gradually; and being the result of a progressing growth of willows favoring the accumulation of fluviatic deposites, it cannot be removed but by digging the actual bed of the river, and extirpating the growth which menaces to stop the navigation.

By deepening, to a proper depth, the channel of La Fourche river, and raising along its margin the necessary dikes, this outlet would both assist the discharge of the Mississippi, and procure, at all times, a commodious communication to the Attakapas.

Such are the main outlets through which the surplus water of the Mississippi might disembogue laterally into the sea; and which could, besides, be used as navigable channels. These objects of internal improvement, being of a nature to be not only highly important to Lower Louisiana, but beneficial, also, to the States bordering upon the Mississippi, they might, at a future day, solicit the attention of the General Government. And it is under such impression, that the Board have submitted, in the present report, these few considerations on the delta of the Mississippi.

SUMMARY.

The coast on the Gulf of Mexico, between Tampa bay and Appalachie bay, cannot be approached by vessels drawing more than five feet: in this latter bay, eight feet can be carried at high tide, to St. Mark. Besides, the ridge of the peninsula of Florida has a mean elevation of one hundred and fifty feet above the ocean, and its top does not offer, at any place, either natural reservoirs or heads of streams adequate to the supply of a canal having very large dimensions. Therefore, a ship channel destined to connect, through the peninsula, the Atlantic with the Gulf of Mexico, is not practicable.

The heads of Santa Fé river and of Black creek, present to a canal for boats, the best passage across the summit of the ridge. Natural reservoirs, in this vicinity, will supply the lockage at the dividing point, whilst it is anticipated that filtration from the ground will keep replenished the trunk of the summit level.

In this direction, a canal from the fork of Black creek to the mouth of the Santa Fé, would connect the St. John's with the Suwannee; therefore, the Atlantic with the Gulf. Such a canal would be about seventy-eight miles in length, and the ascent and descent together, two hundred and fourteen feet.

But the Suwannee being much obstructed at its mouth, and having no harbor at its entrance into the Gulf, it will be expedient to continue the line of canal from the Santa Fé to the harbor of St. Mark. The whole route, from the fork of Black creek to St. Mark, or rather from tide water in Black creek, to tide water in St. Mark's river, will be one hundred and sixty-eight miles long, and the ascent and descent together, two hundred and twenty-four feet.

With a view to an uninterrupted inland navigation, parallel to the coast, from the Chesapeake to the head of St. John's river, it will be necessary to open a sloop canal from the harbor of St. Mary's to the St. John.

Respecting the coasting navigation from St. Mark to Lake Pontchartrain, it will be rendered secure, safe, and commodious, by means of the following improvements: 1st. A canal along Crooked creek, from Ocklockony river to a convenient point in St. George's sound; through this sound and the canal the Appalachicola will become connected with St. Mark. Secondly. The clearing and deepening of the Santa Rosa sound, at the meeting of tides. Thirdly. A canal from the Bay of Pensacola to that of Mobile, through the Great Lagoon and the river Bon Secour. Fourthly. The deepening of the Pass au Heron, between the eastern point of Dauphin island and the main.

Lake Pontchartrain can be connected with the Mississippi by a canal, which has been projected, at or near New Orleans, and by Bayou Manchac.

This Bayou, the rivers Plaquemine and La Fourche, can be rendered navigable at any stage in the Mississippi; and they deserve consideration, as offering the only outlets through which, in time of freshets, the Lower Mississippi might be relieved in the discharge of its waters.

All which is very respectfully submitted.

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WASHINGTON CITY,
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